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3DArtist

49

Practical inspiration for the 3D community

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Creature expert Andrew Baker reveals his pro secrets in our in-depth ZBrush tutorial

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Pixologic.com
ZBrushCentral.com

ZBRUSH

Artist info

Andrew Baker

Personal portfolio site
http://andbakerdesigns.blogspot.co.nz

Location Wellington, New Zealand

Software used
ZBrush, Photoshop

Andrew Baker, senior character and creature designer at the Weta Workshop Design Studio in New Zealand, is a master when it comes to imagining the extraordinary and bringing it to life in ZBrush.

We asked Andrew to lead a step-by-step tutorial to teach us all the art of his incredible workflow. You'll find this on page 54, right after our behind-the-scenes interview with the Weta wizard on page 46. Happy designing!

With the Disc

Discover Andrew's OBJ model, ZPR project file and the final image, complete with layers, for you to learn from his post-production workflow

> Without getting too focused on the technical aspects in the 3D process, I'd like to show how I generally start conceptualising a character by creating a bust and portrait

Andrew Baker reveals his ZBrush wizardry **Page 54**

Master fantasy characters

Page 54

Welcome

to the magazine and 116 pages of amazing 3D

Every issue you can count on...

1. **116 pages of creative inspiration**
2. Behind-the-scenes guides to images and fantastic artwork
3. **A CD packed full of creative goodness**
4. Interviews with inspirational artists
5. **Tips for studying 3D or getting work in the industry**
6. The chance to see your art in the mag!

To celebrate the film release of J. R. R. Tolkien's fantasy novel *The Hobbit*, we've drafted in the superbly talented Andrew Baker – character and creature designer at Weta Workshop – to teach you the art of concepting extraordinary beasts. Learn how he uses ZBrush and Photoshop to evolve his ideas and discover how he landed his dream role at Weta in an exclusive interview.

If characters aren't your thing, we haven't forgotten you! Relish Blizzard's Toni Bratincevic demonstrating how he achieves awesome environments in 3ds Max and see how Eugenio García Villarreal uses LightWave as a tool to create elegant interiors.

Enjoy the issue!

Lynette

This issue's team of expert artists...

Jahirul Amin

J gets heavy this issue to teach the art of animating characters to interact with their environments. First stop: lifting weights!

Andrew Baker

It's not often we get a Weta genius on board, so be sure to learn from Andrew's fine skills in our exclusive tutorial

Orestis Bastounis

When you need to know where to invest your money in hardware, Orestis is your man. This issue he uncovers G-RAID

Ross Board

Our arch-vis guru loves Maxwell Render, so when we asked him to teach us how to light a studio with it, he got stuck in

Toni Bratincevic

Toni takes time out from his day job at Blizzard to reveal his workflow when creating epic environment scenes

Cody Burke

NewTek's very own Cody steps up to reveal the art of Bullet Dynamics in LightWave. Be sure to check out his top tips!

Dmitry Denisov

After last issue's amazing cover, we wanted Dmitry back. This issue he unravels the mysteries of UVLayout for us

Eugenio García Villarreal

Eugenio is a master of atmospheric scenes. This issue he drops by to teach us how to create a unique, vintage-inspired room

Daniele Orsetti

Our MPC friend test drives MARI 1.5 and reveals how this new version will continue the 3D texture-painting revolution

Joe Nazzaro

Author and journalist Joe Nazzaro swoops in to reveal all in a behind-the-scenes interview with Weta wizard Andrew Baker

Filippo Veniero

Championing high quality with free software , Filippo returns this issue to master a Porsche 911 in our Masterclass

Maarten Verhoeven

Pick up some impressive techniques for PolyPainting from the king of ZBrush creatures himself, Mr M. Verhoeven

Sign up, share your art and chat to other artists at www.3dartistonline.com

3D Artist

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Contents 49

What's in the magazine and where

News, features & reviews

8 The Gallery
A handpicked selection of incredible images from across the globe

18 Community news
Keep up to date with the latest news and happenings in the world of 3D

22 3D-printing news
Delve into the latest finds and inventions from this exciting industry

26 Readers' gallery
The 3DArtistOnline.com's community art showcase

28 Have your say
Readers air their views, share problems and chat to the team

30 Game art revolution
How Ubisoft crafted *Assassin's Creed III* with its new approach

38 Virtual production explained
The tools and techniques used to bring effects-driven projects to life

46 Weta wizardry
Character designer Andrew Baker takes us behind the scenes

94 Subscribe today!
Save money and never miss an issue

96 Review: MARI 1.5
The Foundry's production-proven 3D digital paint tool in the spotlight

98 Review: G-RAID
Do you need this stylish storage device in your life? Find out!

99 Review: 3ds Max 2013 Bible
Is this chunky book the gospel on all things Max?

46

A Weta wizard

"The Hobbit pretty much covers everything you're ever going to draw, sculpt or design as an artist"

Behind the scenes with Andrew Baker, senior creature and character designer at Weta Workshop

24

62

Blizzard's Toni Bratincevic reveals his tried-and-tested workflow for 3ds Max

78

Go back to basics and give weight to your characters

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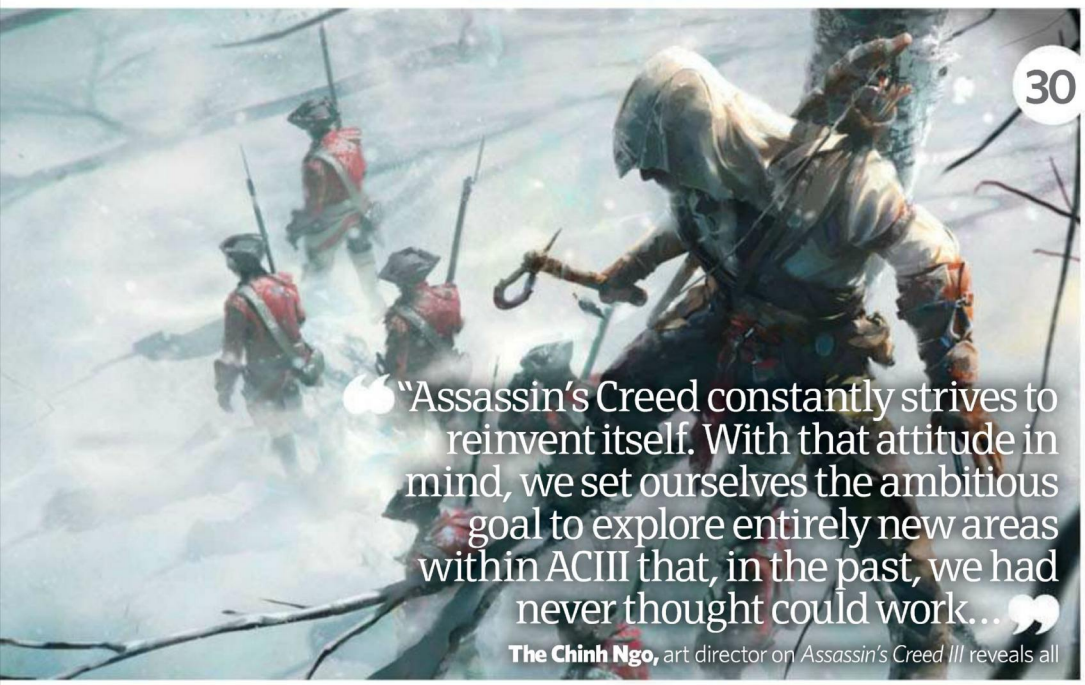
Turn to page 94 for details

Learn to model awesome vehicles with free software, Blender

82

72

Create classy vintage interiors with LightWave



30

"Assassin's Creed constantly strives to reinvent itself. With that attitude in mind, we set ourselves the ambitious goal to explore entirely new areas within ACIII that, in the past, we had never thought could work..."

The Chinh Ngo, art director on *Assassin's Creed III* reveals all

The workshop

Expert tuition to improve your skills

78 Back to basics: Animate a character lifting weights
Jahirul Amin helps us improve realism in our animations with a guide to lifting weights

82 Masterclass: Blender vehicle creation
Filippo Veniero reveals the craft of building vehicles for free

86 Questions & Answers
This section is for users who have some experience of 3D and want to learn more...

ZBrush: PolyPainting tips & tricks

UVLayout: Perfect UVs

Maxwell Render: Learn to light

LightWave: Control fracturing

workspace

Industry news, career advice & more

102 Industry news
Get up to speed with the latest events and releases

105 Course focus: Gnomon training goes online
A Hollywood VFX education for everyone!

106 Project focus: 'Natalis'
Students depict stunning robots in a graduate short

108 Studio access: Adhesive Games
How *Hawken* was created with a modest budget

110 Industry insider: Kevin Margo at Blur
We chat VFX and dreams

The studio

Professional 3D advice, techniques & tutorials

44 I made this: *War-torn Interior* by Jeffrey Severson
An abandoned, gritty interior environment packed with story

54 Step by step: Learn the art of Weta character design
Discover Andrew Baker's ZBrush workflow for creature concepts

60 I made this: *bed.room* by Michael Nugroho
How 3ds Max's Cloth Modifier brought this interior to life

62 Step by step: 20 steps to better environments
Toni Bratincevic reveals the stages of his latest masterpiece

70 I made this: *Andromeda Exiles* by Angel Alonso
Discover how this impressive industrial scene was forged

72 Step by step: Learn to create superior interiors
Take your arch-vis skills to the next level with LightWave

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Turn to page 112 for the complete list of the disc's contents

WELCOME TO

THE GALLERY

Eight pages of great artwork from the 3D community

Images we love!

"A conductor is a master of the music world; he can charge a surging performance without a performer, no audience – just himself. This is my second personal artwork created on the UDA training course. Hope you like it!"

Renpeng Dong, *Climax,* 2012

The team Loves

"A moment in time is perfectly captured here; the expression is spot on and the pose is outstanding. The scene has been composed cleverly to help the viewer peek into the mind of this intriguing composer"

Lynette Deputy Editor

Artist info

Renpeng Dong

3DArtist online

Username: oldrhyme

Personal portfolio site
http://oldrhyme.cgsociety.org

Location Shanghai, China

Software used 3ds Max, Maya, ZBrush, Mudbox, Photoshop, mental ray, V-Ray

Work in progress...

Have an image you feel passionate about? Get your artwork featured in the gallery!

Create your gallery today at **www.3dartistonline.com**

Or get in touch... 3dartist@imagine-publishing.co.uk @3DArtist Facebook.com/3DArtistMagazine

Artist info

Luis Arizaga Rico

Luis specialises in the design, illustration and creation of characters for animation

Personal portfolio site
www.digital-rebel.com

Country Spain

Software used
Blender, GIMP, MyPaint

Work in progress...

The team Loves

When we see images this good coming out of Blender, we get very excited indeed. Excellent work by Luis here – we wish him the best of luck with his upcoming art class!

Lynette Deputy Editor

Everything was created from a 2D concept design I made... This full scene and others are [made] to be delivered to students, showing ... in [a] digital art course [how to create] characters for animation at Digital Rebel Academy. You can find free 3D models to download... under Creative Commons [at] http://academy.digital-rebel.com

Luis Arizaga Rico, *Cartoon Cowboy,* 2012

Artist info

Nicolas Vallée

Nicolas constantly looks for new media, ideas and challenges to push his creativity further

Personal portfolio site
www.ico-art.fr

Country France

Software used
ZBrush, 3ds Max, Photoshop

Work in progress...

The team Loves

"What an incredibly ornate sculpt for someone new to ZBrush! There's a mysterious wisdom in the eyes of this faun..."

Chris News Editor

"Last spring I was giving some graphic-design classes at the Aries School of Design of Grenoble. While there I had a chance to benefit from the vast knowledge and advice of two 3D professionals who teach there... I decided to start a new project to train myself in ZBrush" **Nicolas Vallée,** *Forest Creature,* 2012

The team Loves

Pascal is a key figure in the community. His unique style has inspired many artists around the world. We love *Danu* for its intriguing sense of scale and delicious colour palette!

Lynette Deputy Editor

Artist info

Pascal Blanché

After two years working on *RuneScape* for Jagex, Pascal is now back at Ubisoft Montreal

Personal portfolio site
www.3dluvr.com/pascalb

Country Canada

Software used ZBrush, 3ds Max, Photoshop, V-Ray

This image is [part] of a full 12-picture collection I did for my art book, based on a fantasy I created about the King Arthur legends, set up in a science-fiction world

Pascal Blanché, *Danu*, 2012

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> I wanted to make a town or city in [an] Asian style; there are houses, cliffs, mountains and trees [all] interacting with one another. Few people know there's a town because [here] the mountains hide it and the trees cast the shadow during most of the day, so it's named 'GreenShadow Town'. [The] lights are always on… whether it's day or night

Yang Bo, *GreenShadow Town,* 2012

Artist info

Yang Bo

Yang is an environment artist and has been in the videogames industry more than eight years

3DArtist online

Username: arthuryang

Country Shanghai, China

Software used
3ds Max, Photoshop

Work in progress…

The team Loves

"There's something so friendly and inviting about the curved nature of these buildings and the warm lighting used throughout. The sense of depth achieved is awesome, too"

Lynette Deputy Editor

Artist info

Rod DeWeese

Rod worked for eight years in the landscape architecture industry before pursuing freelance work

3DArtist online

Username: RDeWeese

Personal portfolio site
www.rdeweese.com

Country US

Software used
3ds Max, mental ray, Photoshop

Work in progress...

The team Loves

"The details in this image give it a rich, European feel, from the cobbled pavement with water details to the various plant life dotted around the scene... Anyone else see a gnome?"

Chris News Editor

"This image was created for a contest by the Gnomon Workshop. It's something I had wanted to do for a while but never got around to, so the contest was the perfect excuse to do it. By the way, I took second place in the competition!" **Rod DeWeese,** *Old World Alley,* 2012

Artist info

Arthur Duque & Rogerio Stefanuto

Arthur and Rogerio have worked for over eight years in 3D, specialising in modelling, texturing, lighting and rendering

Personal portfolio site
www.pixobox.com.br

Country Brazil

Software used
3ds Max, V-Ray, ZBrush, Photoshop

The team Loves

"This scene could almost be pulled right from a Pixar movie – you could imagine Carl Fredricksen sitting in that chair!"

Chris News Editor

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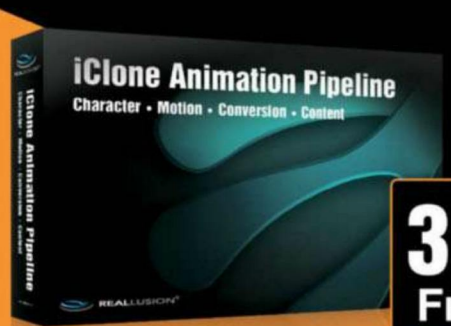

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'The Monster' is a final-year AUCB animation project by Toby Dixon, Lynne Liu, Ady Holt, Anne Rufin and Francis Kelleher

A Diana David's NCCA film 'Perspectives' tells the story of Blue, a boy trying to overcome some of life's struggles

B NCCA students Michael Agoulas and Valentinos Demetriou's 'The Game Changer' shows a gambler's daily routine

C Alex Stockwell's NCCA project 'Lumen' is an animation showcasing his lighting, shading and VFX talents

The BFX Festival is on its way

A new visual-effects festival in the UK seeks to educate as much as it entertains

Summer 2013 is set to see the arrival of a brand-new festival aimed at celebrating British talent and creativity in animation and visual effects. Created by the National Centre for Computer Animation (NCCA) at Bournemouth University and the Faculty of Media, as well as Performing Arts at the Arts University College Bournemouth (AUCB), the BFX Festival is planning a number of events that will educate and inspire CG enthusiasts across the UK.

"BFX was created in response to the National Endowment for Science, Technology and the Arts' (NESTA) 2011 Next Gen report, titled 'Transforming the UK into the World's Leading Talent Hub for the Videogames and Visual Effects Industries'," says Sofronis Efstathiou, postgraduate framework leader at the NCCA. "The report made a number of recommendations. In particular it discussed the need to do more to educate children, parents, teachers and the general public about the existence of the UK's creative industries and how they could provide viable and rewarding career opportunities. So, while the industry already recognises both institutions in Bournemouth as some of the best in the field, the BFX Festival will expand on that. It's a celebration of all things VFX but it's also a much deeper endeavour; to inspire, educate and ultimately bridge the skills-gap shortage that the British VFX industry is experiencing right now."

At the core of the festival will be a six-week competition for VFX students from around the UK.

> "A crucial part of BFX is encouraging young people to take up the necessary subjects at school to help get them a good foundation if they want to be involved at university and beyond"
>
> **Sofronis Efstathiou,** postgraduate framework leader, NCCA

Held on the Bournemouth University and AUCB campuses, the competition will see participants work in groups of five under studio conditions, creating short visual-effects or animated sequences to studio standards. "A panel of selected industry judges will have the task of picking the winning team," says Efstathiou. "We've got some very special friends involved including Framestore, Double Negative, Cinesite and The Mill – all of whom are keen to offer internships to the winners. That said, just being part of this six-week process will give participants something great to put on their CV."

Following this competition will be an autumn festival in Bournemouth, which will comprise of masterclasses, workshops, screenings and exhibitions of the very best VFX from around the world," says Efstathiou. "We'll be drawing on our bank of illustrious alumni who have worked on films such as *Inception*, *Avatar* and *The Lord of the Rings* to share their knowledge and experience."

Learning & development

Sofronis Efstathiou of the NCCA discusses the BFX Festival's educational side

"As well as family friendly activities we are intending to hold fun and educational workshops at a number of local schools as part of the festival... A crucial part of BFX is encouraging young people to take up the necessary subjects at school to help get them a good foundation if they want to be involved at university and beyond. We also want to educate parents that a career in the creative industries is a well-respected and viable option for their children, but they need to be prepared by choosing the right subjects: art and maths."

Creativity by the sea

The NCCA's Sofronis Efstathiou explains why Bournemouth is a location where 3D creatives can thrive

"As well as being awarded a Queen's Anniversary Prize for world-class teaching, the NCCA at Bournemouth University was cited in the NESTA report as a centre of excellence within the UK, noting that it had successfully combined the arts and sciences as part of its educational curriculum for more than 23 years.

"The Animation, Film Production and Digital Media courses offered by AUCB are recognised internationally for the quality of their creative and theoretical practise.

"With such institutions, Bournemouth has solidified its reputation for creating innovative, world-class animation and VFX. With this creative hub set on the map and being a couple of hours from London, companies are able to set up satellite studios, fed by a talent pipeline of graduates direct from these institutions. That's exactly what Framestore has done, which is now operating a studio based in Bournemouth and working on some of the year's biggest films. You can't offer your graduates better employment opportunities than that!"

Congratulations go to NCCA's Leo Crane for his animated short 'The Library', which was awarded the Student Film Award at the Miami International Animation Festival

NCCA students David Fisher and Pramod Lakshmanan Jayaprakash used Bournemouth as the setting for their VFX work, 'Balloon City', where the town's inhabitants pull down buildings to reveal colourful balloons

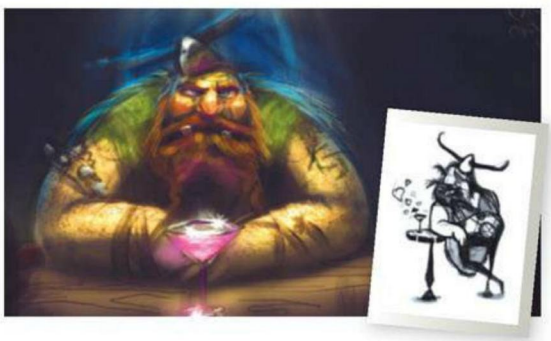
Masterpiece

'One More Beer'

Pedro Conti discusses his homemade minute-long comedy inspired by How to Train Your Dragon

Pedro Conti www.pedroconti.com

Pedro Conti is a 3D generalist from Brazil focusing on lighting and shading – two disciplines that really shine in the atmosphere of this piece



Pedro Conti's short film 'One More Beer' – in which a burly Viking settles down for a drink rather unbefitting of his character – was never originally intended as a movie. "The project started as a quick sketch. I had no idea [I'd create] a short!" says Conti. "My main goal was to develop my skills as a character artist. I had watched *How to Train Your Dragon* and wanted to create a Viking character, but I was not satisfied with any random Viking. One night I woke up with an idea of a big Viking in a tavern with a tiny pink Martini and I thought that would be a funny contrast."

Conti used 3ds Max with mental ray as the main platform, with ZBrush and Photoshop for the creation of the main character. The post-process was completed in After Effects with plug-ins such as Frischluft Lenscare.

"The beard and final render were a real nightmare," remembers Conti. "The scene was complex and the computers were crashing all the time, so the handmade rendering management was the most painful process." You can watch the short at www.pedroconti.com.

3D Sketchbook

Complex robots

How you can take a generic robot concept and turn it into something unique

Lee Kyoung Min www.kyoungminlee.com

This imposing and complex ZBrush sculpt is clearly the work of someone very familiar with the software, so it's not surprising to learn that artist Lee Kyoung Min has been using it for seven years now. "When I first started to create this character I did face some difficulties due to its complexity, as it was my first attempt at creating a character with a hollowed interior," he tells us.

"However, I believe that by giving this character a hollowed interior it makes it stand out from the crowd," continues Min. "It's more impactful and gets into the imagination of the viewers. Of course, I must give some credit to concept artist Pavel Savchuk from my current company Redstream, for the initial concept."

Min started out making the robot's simple shapes in ZBrush, then turned to 3ds Max to create the main frame. Once satisfied with it he went back to ZBrush for details, including scratches and the damage effects. "Most of my artwork is created with this software due to my familiarity with it," says Min. "I have attempted other software, but I continue to find these more suited to my style."

Original concept by Pavel Savchuk

The character's bulky figure and muscular limbs give him a somewhat threatening quality

Min offers tips for your own robot creation

"For me, ZBrush is a good tool to start off with by trying out various shapes. Do not think about putting details in from the beginning – you need a good shape first. When I am happy with the shape I will create the character in 3ds Max.

"To create the hollow body here I started making the outer metal first and then later placed the bones inside. However, every artist has their own style. I think it's important to explore and experiment to find whatever is best suited to you."

Artist spotlight

Mixing it up

Russian artist Marat Ars highlights the importance of variety in his work

Ars Marat www.marat-ars.blogspot.co.uk

Hailing from Russia, freelance 2D/3D artist Marat Ars has been following his love of art for almost a decade, exploring a wealth of different disciplines. "During this time I have worked in printing, interior design and architectural visualisation, the creation of ads for television, game development and so on. I genuinely love my job and I'm constantly looking for ways to improve my skills."

Ars' recent work showcases a tremendous dedication to detail and a well-honed ability to create believable sci-fi and fantasy characters. He doesn't limit himself to just one style, however. "I don't like repetitions and I don't want to limit myself. I'm always interested in trying something new."

As for tips, Ars offers the following: "Love your work from start to finish. Pay attention to the details, as this is key to a successful piece of work. Don't lose motivation and try to always stay interested. If you do become distracted, leave the work for a while then come back to it. This way you'll see your mistakes with fresh eyes." Ars' final words of advice? "Don't be lazy! That's all."

Ars has developed a great level of speed in 3ds Max, saying that the software is perfect for "creating models of any complexity"

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Expand your library with free assets

New site www.theCADcube.co.uk is for designers looking for 3D CAD models to integrate into their projects. "Rather than providing generic, user-generated content that you have to pay for, we're building a library of CAD models of manufacturer products," says founder Darren Lester.

The CAD models range from furniture and lighting objects to building components and materials in a range of file formats compatible with AutoCAD, 3ds Max, SketchUp and more.

"Our dashboard features [also] enable you to easily save and share CAD models with other users..." concludes Lester.

behind the scenes

Naturally fashionable

NCAA postgraduates create a fashion show with a difference

Inspired by images in Milla Jovovich's Campari Calendar, 'Adorn' was created as a Masters degree project by NCCA postgraduates Tomas Slancik and Milan Kolar. "We started out with greenscreen footage of the models. Tracking markers were painted on their skin and placed around the set to get as much 3D information from the track as possible.

"The dresses and hair were created using a mix of all the techniques we could think of. Bases for the dresses were modelled traditionally around the dummy geometry and slightly sculpted in Mudbox to create some drapery-like structures. Houdini was used to create all the effects and details, fluid simulations for the liquid metal and lava, and Pyro for the dry-ice smoke.

"The biggest surprise for us was the complexity of matchmoving on the project," they continue. "In this case we needed all the geometry and cameras to be really precise, because we were going to put geometry and pour liquids directly on the skin, so any error would be visible right away."

You can watch 'Adorn' at http://tinyurl.com/NCCAAdorn.

"Most of the geometry and shaders were partially procedural so we could always go back and do tweaks without breaking everything. For example, we could easily change hairstyles by plugging in a new set of guide curves," say the duo

Inspiration corner

Realistic arch vis

Brazilian artist Alberth Costa da Silva discusses pushing the boundaries of arch-vis realism

Alberth Costa da Silva www.alberthcosta.wordpress.com

Costa da Silva is something of a 3ds Max expert, having worked with the software since version 3. "I remember being thrilled with some videos created with the program of a meteor falling in flames... I've been in love with the software ever since."

Costa da Silva has also been a long-time fan of V-Ray, "[It's] one of the best renderers today – the quick and easy settings make for more quality in my work. I wouldn't use anything else."

For arch-vis interiors, Costa da Silva insists that there is no one method for success. "It's not a cake recipe. If you want to reach excellent quality, the best tip is to study hard, look for different references on the internet from various artists and play with things such as shaders, lights and compositions..."

"During my career I've been through the major studios in Brazil," says da Silva. "My dream is to be part of a great team... outside of Brazil, as it would allow me to discover other working methods and cultures"

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3D printing on show

The first 3D Printshow aimed at capturing the excitement of 3D printing was a big hit in London

A catwalk show featuring 3D-printed fashions was one of the highlights of the first annual 3D Printshow, held recently in London. Around 4,000 3D-printing enthusiasts attended the show over three days, where companies like Formlabs, MakerBot and Objet were present. CEO Panel Sessions saw eight 3D-printing experts discuss the future of the market, while seminars from industry artists proved popular, including Legacy Effects' Jason Lopes talking about 3D printing and its use in films like *Iron Man* and *Thor*. Palaeontologist Louise Leakey also discussed the role of 3D printing in her work discovering fossils in Africa.

The fashion show featured designers such as Stephen Jones, Niccolo Casas and Bryan Oknyansky, as well as music from Onyx Ashanti and 3D Printshow's own band – complete with 3D-printed instruments!

3D Printshow's catwalk not only featured high-tech fashions, but 3D-printed musical instruments too!

Fancy buying a 3D printer?

A new free guide aims to help companies decide which 3D printer is right for them

3D printing is "more than just prototyping", says the buyers' guide released by 3D Systems. Written with the aim of directing you through the range of 3D printers now available, it breaks the jobs that someone might use a printer for into four categories: concept models, verification models, pre-production applications and digital manufacturing. The guide then advises which features and types of printer are best for each. The cost of parts, accuracy, print speed and material properties are some of the factors considered. Visit **www.3dsystems.com** to download the guide.

New materials at Shapeways

Hot Pink and Royal Blue are two of the new colours now offered by the growing 3D-print store

While artists already have a long list of materials they can choose for their Shapeways products, the site is now polishing its Coloured Strong & Flexible products and adding new colours. Visit www.shapeways.com to discover how to print your 3D.

Bowie the Bunny by BAROBA was 3D printed by Shapeways using the striking new colours

Customise your iPhone with this new app

Launched at the 3D Printshow, 3DPCase is the new mobile app for iPhone fans

Customisation is the name of the game for Sculpteo

3DPCase is the first-ever app for making, customising and ordering bespoke 3D-printed iPhone cases – straight from your smartphone. It enables you to add text, textures and patterns, all using Sculpteo's 3D-printing technology and its Cloud Engine.

The app is free from the App Store and the aim is to democratise the 3D-printing process, as the 3D-printed cases start from $14 US. Sculpteo has worked with a range of designers – including NoDesign Studio, Cinemo and Glucose Sweet Design – to create a range of looks that can then be customised. Some of the designs are even DIY kits that you can finish at home. Visit **www.sculpteo.com** for more information.

Advice for artists

Shapeways user Carl Collins of GothamSmith discusses the 3D-printing process

What do artists have to consider?

Make sure you read the specifications for each material – the tolerance levels for thickness... [Although,] the [Shapeways] system is pretty good at letting you know when a file can't be produced.

Are you using the new materials?

Plastic is great! We sometimes use it for prototypes because it's faster and cheaper. We're excited about some new metal-production techniques that we've heard are coming soon. We're also hoping to try out ceramics and possibly coloured sandstone.

Check out the fantastic GothamSmith product selection on Shapeways at **www.shapeways.com/shops/gothamsmith**

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This tutorial will show you how to create an interior bedroom scene, focusing on texturing, cloth simulation and lighting. You'll learn techniques I have developed throughout my career as a 3D artist, including basic modelling, using essential LightWave Modeler tools and the best way to find good textures with complementary maps, such as Bump and Displacement.

We'll also focus on lighting and how to make warm scenes with contrast to achieve a dramatic mood. Last we'll tackle the compositing process, exploring some of my favourite techniques to fine-tune details, use colour correction, masks, textures as well as simple matte-painting techniques. I'd like to thank Alejandro Tello, a talented artist at D10Studio who helped me with the final colour correction on this image.

Research and sketch

Explore the perfect shot for your scene

01 Start with a sketch I use basic 3D shapes to create a quick 3D sketch. This will help me with the final compositing later on, as I can touch up this 3D base in Photoshop to add objects and atmosphere. So, along with an initial sketch, this is a solid base for the following the project

02 Time to model In my workflow I tend to use basic box modelling, cylinders and primitives. For bed clothes I use subdivided box planes. For the bed and window decoration I work with Spline Guides using the Rail Extrude tool. It's also a great idea to reuse old models when you can, such as the petrol lamp and the radio in this scene. For the chair I follow a simple spline and box-modelling workflow

- Create a basic sketch to find the right composition
- Models are kept very simple, as shaders and textures will improve them later
- The Spline Guide helps you to bend, twist and change scales

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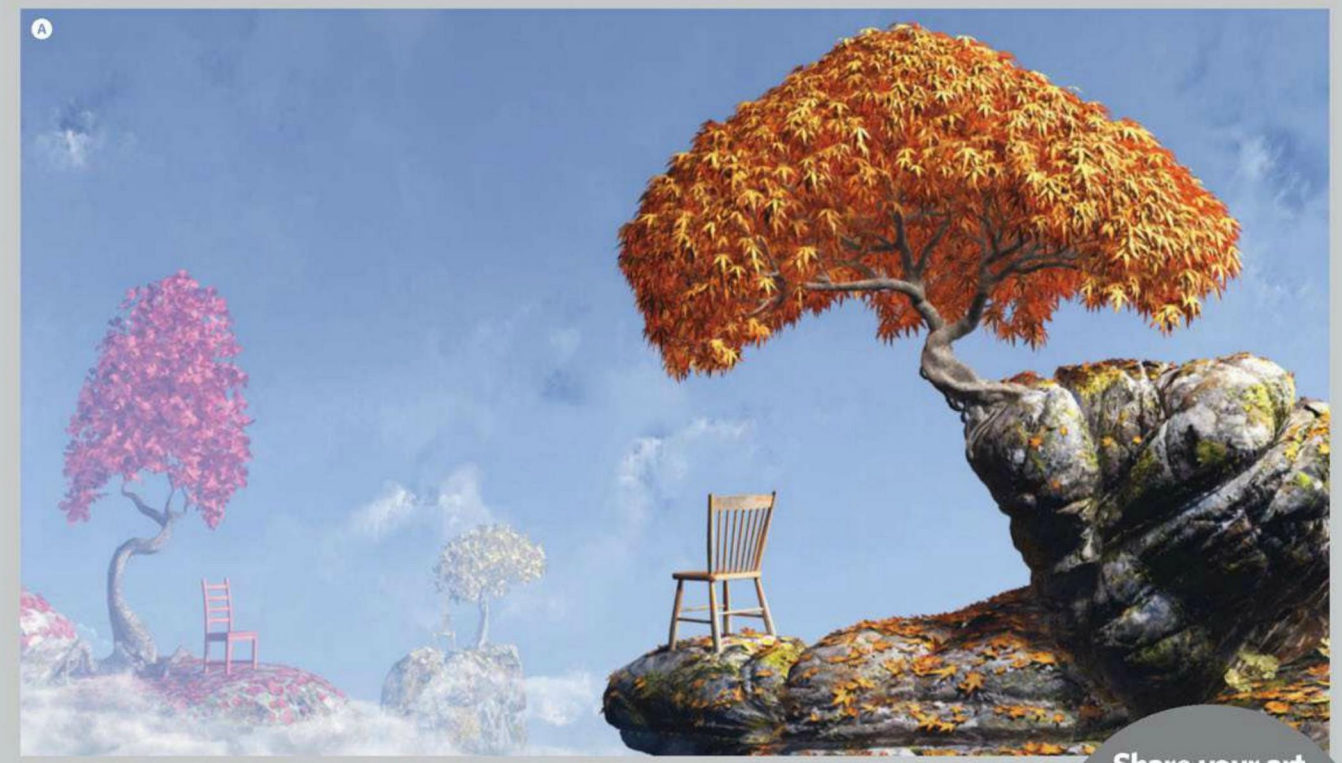

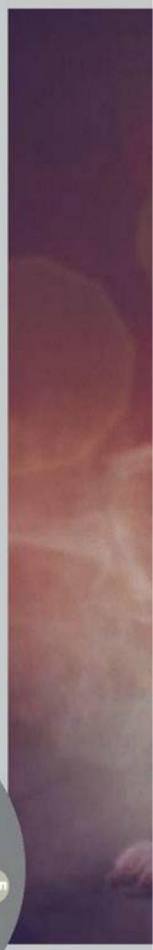

Pictures of the week

THESE ARE THE IMAGES THAT WERE AWARDED PICTURE OF THE WEEK IN THE LAST MONTH

A Leaf Peepers
» **Cynthia Decker**

Cynthia says: "I live in an area where many people come to see the trees turn colour in the fall. These seasonal tourists are called 'leaf peepers'. So if you only have three trees, you'd better have a good viewing spot for each one!"
We say: This playful environment is wonderful – we love the sense of height Cynthia has captured!

B Mantis
» **Fat Tudor**

Fat says: "A creature located on a distant planet that has similarities with the Mantis bug [that can be] found on our planet"
We say: This incredible creature looks like he's just stepped straight off the set of a sci-fi flick! The pose and camera angle really sell this one for us

C Fairouz
» **Mohamed Abdelfatah**

Mohamed says: "My latest personal work [is an] oriental character inspired by an Egyptian Hijab style [to practise] drapery and figure anatomy... I used ZBrush for modelling, sculpting and texturing"
We say: This beautiful lady has a real charm about her – all thanks to the thoughtful pose and careful attention to clothing details. Excellent!

D Rainy Day Atoz
» **Luca Catino**

Luca says: "Hi everyone, this is my last finished work created after a small trip in Paris during March 2012. I had a lot of fun making this small interior and modelling all the stuff inside"
We say: This caught our attention immediately – the contrast and composition really help this beautifully modelled interior stand out

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to view the art and chat to the artists

Picture of the month

What's in next issue

3D Artist 49
www.3DArtistonline.com
Practical inspiration for the 3D community

Van Halen eat your heart out!
Jahirul Amin
Personal portfolio site:
www.warpeaceandpixels.com

Learn how to animate a jump

Issue 50: on sale 2 January

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You tell us

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Soooo, Disney has bought out Lucasfilm. Thoughts anyone? What is this going to mean for the movie industry? Happy? Excited? Angry? Lots of emotions flying around today – share your thoughts...

Adrian Zuanic It's just money business. Wait and see I guess. It all depends who the creative minds behind it are.

Henrik Mølgård *Star Wars 7* to *15* is going to be announced very soon...

Antonius Sjet So what? *Avengers, Wall-E, Iron Man 3* made in co-production with Disney, this doesn't make them any worse...

John L. Haverkamp Ralph McQuarry WAS *Star Wars* to me!

Jean-Luc Parent There are pros and cons to every acquisition. Obviously die-hard fans of *Star Wars* will get queasy at an *Episode 7* announcement. But for Disney, it's more than just buying out the Galactic Empire. They also got effects house Industrial Light and Magic, and sound and music production company Skywalker Sound. Two respected titans in the world of post-production now added to Disney's already expansive movie-making arsenal.

Rodney S. Allen Lucasfilm and the *Star Wars* franchise has always been geared towards the family; no gore, but still action. With Disney taking on ownership of *Star Wars*, it doesn't mean nice and fluffy as some may put it. Most Disney films are violent minus the gore... As for the rest of ILM, well, they have some of the best creators/innovators in the business. I say Disney has just acquired an onslaught of new talent that can now take films and theme parks to a totally new level of adventure.

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THE AUTHOR OF THIS ISSUE'S STAR LETTER WINS A MONTH'S FREE SUBSCRIPTION TO DIGITAL-TUTORS WORTH $45

Star letter

We all like a good rant

Hi Lynette... if I may have one little whine: your magazine states that [your disc content is] on the disc, but when I put the disc in, in fact I have to download [some of] the content from the web.

This fact won't deter me from buying your magazine in the future, because I absolutely love the artwork – I can only dream of being able to create some of those wonderful pieces...

So, in the future, [could you] either move to a DVD so that there is room for the advertised content, or at least make it clear on the page [making sure that] items needing to be downloaded are clearly indicated as such?

Anyway, love the mag and thank-you very much...

David, by email

We pack our discs to the brim with content for you, so some of it needs to be downloaded. Check out our With the Disc pages

Thanks for your feedback, David! Since you reported the problem (issue 43) we have made every effort to make it clearer what is located on the disc and what must be downloaded – you can check out our new and improved CD pages this issue.

We appreciate not everyone has fantastic internet connections, though, so if a DVD ever becomes an option for us in the future then, trust me, we'll be all over it!

For your feedback, we're crowning you the winner of this issue's Star Letter prize. You'll need an internet connection to enjoy the Digital-Tutors' one-month subscription to a wealth of professional training, but we hope you'll benefit from it.

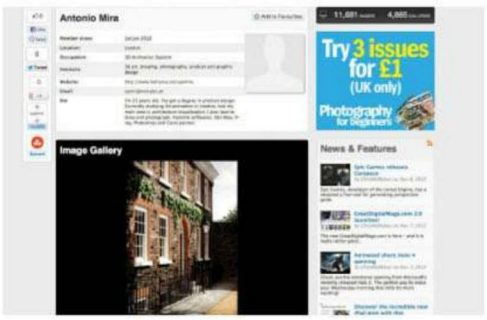
This fantastic tutorial by Lewis Rowe is one of our favourites, which is precisely why it's made it into the *3D Art & Design Book*!

Feeling a little crafty...

Hello, I'd like to buy 3D Artist issue 36 but it's no longer on sale. I need this tutorial – can you help me somehow?

Midhat, by email

Hi Midhat, the tutorial you're after can be found in the 3D Art & Design Book: ***www.imagineshop.co.uk/bookazines/digital-creativity/the-3d-art-and-design-book.html.*** *If you order before 24 December you'll also get 10% off the cover price!*



How can I get featured?

Hello, I would like to know how I can have 3D artwork featured in 3D Artist magazine? I already have a profile created with some of my work: www.3dartistonline.com/user/apmira. Thank you,

Antonio, by email

Hi Antonio, thanks for creating a free portfolio on ***3D Artist Online.*** *The* ***3D Artist*** *team regularly selects an Image of the Week here, so you're in the right place! Feel free to email us if you have a particular project you'd like to share that we may not have seen: 3dartist@imagine-publishing.co.uk. Best of luck!*

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IMAGE FROM *SCULPTING CHARACTER PROPS IN ZBRUSH*

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Voramas

GAME ART REVOLUTION

We take a look at how Ubisoft has crafted one of the most visually stunning games of the generation in Assassin's Creed III

Words: **Chris McMahon**

When we first booted up *Assassin's Creed* in 2007, we had little idea of what was in store. Desmond Miles – bartender, slacker, unbeknownst assassin – awoke in the clinical confines of an Abstergo lab, held against his will by a mysterious cabal known as the Templars and forced to relive the memories of his ancestors through a nifty bit of sci-fi kit called the Animus.

That first adventure took us back to the Third Crusade, taking on the role of Levantine assassin Altaïr Ibn-La'ahad as he journeyed the wild plains of the 12th Century Holy Land and its surrounding cityscapes.

For Desmond's second outing we were transported to the cultural shift of the Italian Renaissance. Our travels as the charismatic Ezio Auditore da Firenze were greeted by 15th Century restorations of Monteriggioni, Venice and Rome.

Now, in this third ancestral exploration of memories past, we're in the deer-hide boots of half-Mohawk Ratonhnhaké:ton – or, going by his more comfortably pronounceable nickname, Connor. The action takes place right at the heart of the American Revolution amidst a sprawling frontier of forests and undulating mountain ranges.

From its stark beginnings in a cold, white lab to an adventure spanning almost six centuries, no one could label *Assassin's Creed* as lacking in ambition. Wider in scope and purpose than the majority of videogames out there, it's a serious achievement, growing larger and more impressive with each new release.

From the superlative animations to the richly detailed cities that are almost characters in and of themselves, the series' visuals have evolved in step with the breadth of its narrative. Each new title pushes the bar in terms of graphical fidelity and technical nous.

Assassin's Creed III (*ACIII*) is the culmination of developer Ubisoft Montreal's efforts so far. Along with the upgraded AnvilNext engine, a team of hundreds has produced one of the finest-looking, most graphically impressive titles at the back-end of the current generation of games.

We sat down with art director The Chinh Ngo, technical art director Danny Oros and animation art director Jonathan Cooper, to discuss the journey they've taken to get here – a feat in many ways as impressive as Desmond Miles'...

Concept art is a powerful tool used by developers during the conception of games – not only because it has the power to communicate a clear visual to the whole team, but also because it validates artistic references

UBISOFT

A glance at one of the biggest videogame developers in the world

Studio name Ubisoft Montreal

Location Montreal, Canada

Company history Ubisoft Montreal was opened in 1997 as a subsidiary of Ubisoft, initially developing low-profile projects like *Tonic Trouble*. *Tom Clancy's Splinter Cell* put the studio on the map, however, followed by videogame classic *Prince of Persia: The Sands of Time*. Over the years, titles such as *Assassin's Creed* have seen the studio grow to become one of the largest in the world – currently housing over 2,100 employees.

Portfolio Highlights:

Assassin's Creed: Revelations, 2011
James Cameron's Avatar: The Game, 2009
Prince of Persia, 2008
Far Cry 2, 2008
Assassin's Creed, 2007
Far Cry Instincts, 2005
Prince of Persia: Warrior Within, 2004
Prince of Persia: The Sands of Time, 2003
Tom Clancy's Splinter Cell, 2002
Tonic Trouble, 1999

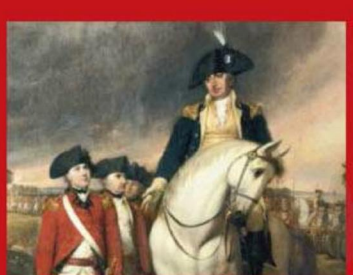
Connor's character-defining actions, such as walks, runs and idle animations, were tweaked throughout development as the team became more aware of who he was as a person

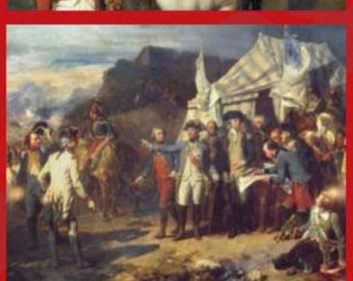
GATHERING REFERENCE

Ever since the release of the first Assassin's Creed in 2007, the series has been revered for its adherence to historical accuracy. Each game features real characters and locations from the time period in which it takes place. *Assassin's Creed III* is no different, drawing upon a great deal of Revolution-era reference to ensure consistency in its vision for the world.

"*Assassin's Creed* as a brand has historical relevance and accuracy as a core value for our development parameters," explains The Chinh Ngo, who worked on both *Assassin's Creed II* and *III*. "Thankfully there are a lot of historical references for the American Revolution: original drawings, maps, and much of the authentic colonial architecture still exists. We also worked with a historian in our team; he helped us a lot with research so we developed a better understanding of 18th Century America."

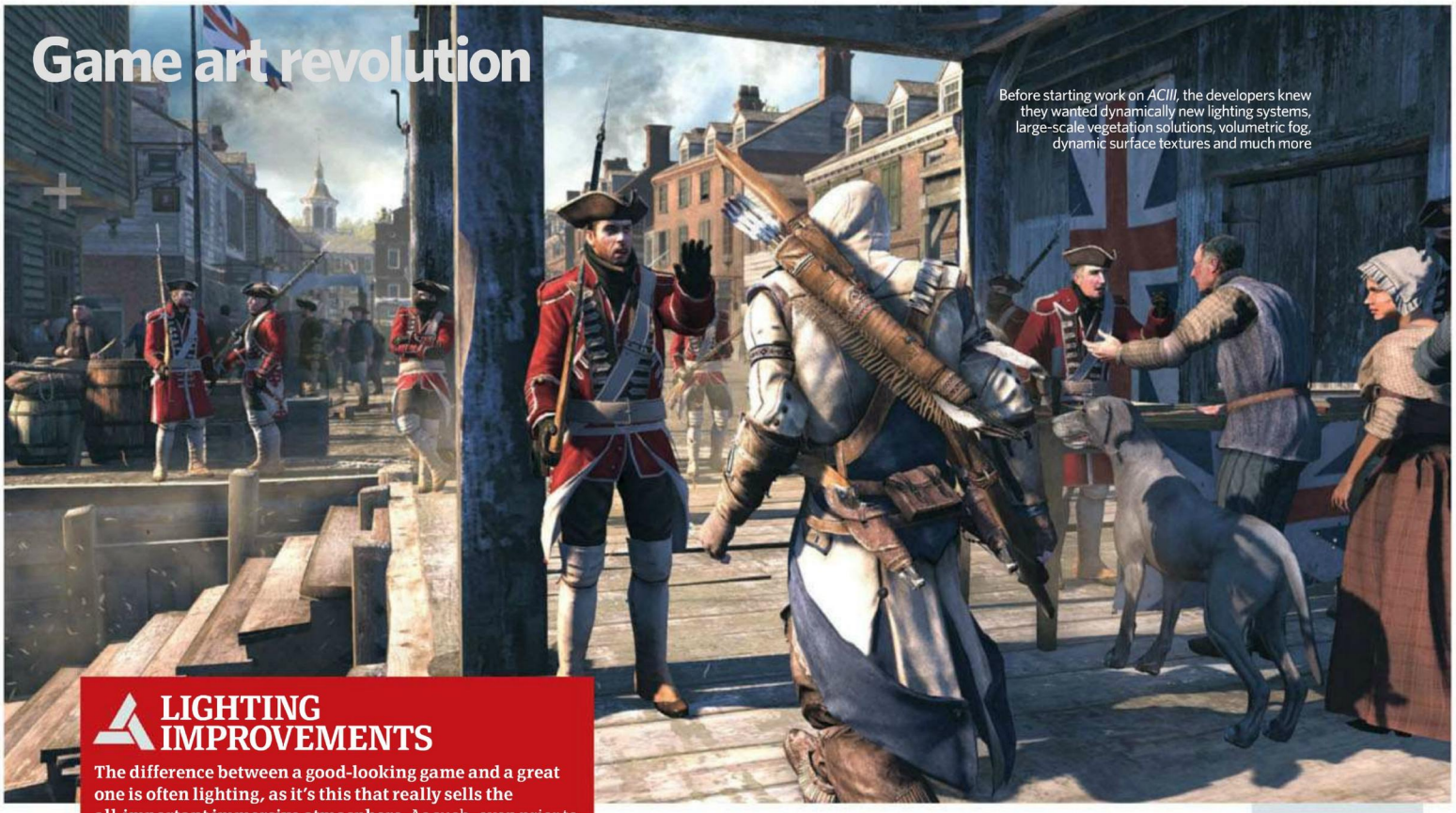
Although historical accuracy is a necessity, the team must still allow for some degree of artistic license when it comes to actual game design. "We grant ourselves space for artistic freedom and fictional elements," says Ngo. "Our challenge is always to find the delicate balance between this historical accuracy and creative freedom, so as artists we do not restrain ourselves too much."





There was plenty of reference material left over from the 18th Century that Ubisoft Montreal could use to build *ACIII*'s game world – a benefit it could not rely on for the first game's Holy Land setting

Game art revolution



Before starting work on *ACIII*, the developers knew they wanted dynamically new lighting systems, large-scale vegetation solutions, volumetric fog, dynamic surface textures and much more

LIGHTING IMPROVEMENTS

The difference between a good-looking game and a great one is often lighting, as it's this that really sells the all-important immersive atmosphere. As such, even prior to working on *ACIII*, Ubisoft Montreal knew that lighting was an area they were determined to improve. "There were certain risks and costs we couldn't afford to take on the shorter development cycles of the *Assassin's Creed II* games, but we knew there were a few things that needed improvement going forward – character detail, global image fidelity, atmospherics and lighting," says technical art director Danny Oros. "Specifically lighting-wise there were limitations and issues we wanted to get around in terms of surfaces, global illumination simulation quality, popping and so on.

"For *ACIII* we adopted a deferred lighting architecture, which unified shading and specular on all surfaces for a fixed performance cost, enabling cost-effective surface weathering for snow and rain," explains Oros. "This change also significantly improved fillrate for scenes of massive overdraw, such as our forests, which ended up being a big plus for us.

"Other smaller but significant lighting improvements include a new global volumetric ambient occlusion and static lighting system (with specular), screen space ambient occlusion, shaders and so on. All of this together improves the game environment's global lighting solutions in all its time, weather and seasonal conditions."

ACIII's lighting is most impressive in confined indoor spaces, such as in the fast-travel tunnels that weave beneath the game world and the caverns that Desmond Miles occupies when outside the Animus

> "THERE WAS NO QUESTION OF INCORPORATING THE NATURAL SPACES – IT WAS AN ESSENTIAL PREREQUISITE OF THE SETTING OF ACIII"
>
> **The Chinh Ngo,** art director

A LIVING, BREATHING WORLD

Assassin's Creed's environments have always been astonishingly impressive spaces, whether they're the golden hues of Jerusalem or the rich Renaissance architecture of Rome. However, Ubisoft knew players would demand more than just an aesthetic change for this third entry into the series. These game worlds aren't just environments after all, but playgrounds too. It was this line of thinking that led to a new kind of setting for *ACIII*.

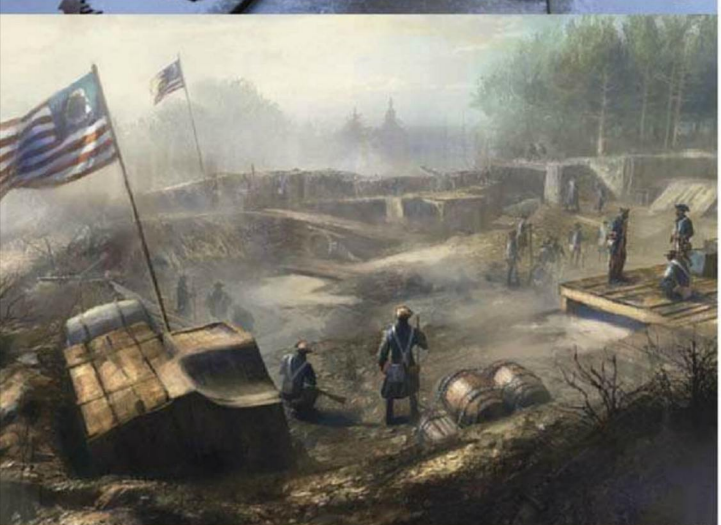
"As a brand, *Assassin's Creed* constantly strives to reinvent itself," says art director Ngo. "With that attitude in mind, we set ourselves the ambitious goal to explore entirely new areas within *ACIII* that, in the past, we had never thought could work for the series. We took the leap of moving beyond the city limits to the organic environments of the forest and frontier."

These large woodland environments, where a huge amount of the game takes place, truly are a sight to behold. The terrain naturally flows from mountainous canyons, through towering pine forests and across swaying planes of lush grass. All of this manages to feel organic, believable and entirely natural. "There was no question of incorporating the natural spaces – it was an essential prerequisite of the setting of *ACIII*," continues Ngo. "The cities of Boston and New York at the time were very young and didn't have a strong enough visual 'wow' factor on their own, when compared with the sprawling European Renaissance cities, so we added the wilderness and the frontier."

Although the *Assassin's Creed* games have featured natural spaces in the past, they have never before been achieved on such a large scale – and certainly not with this much attention to detail per square foot. Unsurprisingly, the technical challenge this presented the team was no small undertaking. "There were many challenging things to consider – most of all rendering performance," explains technical art director Danny Oros. "Thick foliage and vegetation scenes cost a lot to render due to the sheer amount of layering on display, with hundreds of levels of overdraw. Performing this seamlessly in a free-roaming... open-world context over four square kilometres is additionally challenging, all the while keeping a good level of visual and artistic quality.

"This particular challenge was partially resolved by the use of deferred lighting – that is, lighting only the final pixels, as opposed to lighting each one as they are layered atop one another as in previous tech," he continues. "However, it also required significant optimisations and content control, including replacing our previous vegetation tech, rewriting optimal shaders like lighting, shadowing, wind

The golden hues of the first Assassin's Creed's cities and the ornamental flourishes of *ACII* have been replaced by the darker greys and browns of Boston and New York's 18th-Century architecture



Rendering performance was a big challenge facing the team, particularly because of the rich, sprawling, open-world environment of the American frontier being re-created

Reference material was essential for achieving an authentic aesthetic for the game. Luckily there is still a good deal of Revolution-era architecture that has survived in the United States

> "THERE WERE MANY CHALLENGING THINGS TO CONSIDER, MOST OF ALL RENDERING PERFORMANCE… THICK FOLIAGE AND VEGETATION SCENES COST A LOT TO RENDER DUE TO THE SHEER AMOUNT OF LAYERING"
>
> **Danny Oros,** technical art director

reactions and so on, while strictly budgeting for content and placement."

The expansive, natural landscapes of revolutionary America comprised of great variety in terms of their topographical nature and terrain, ranging from plains and cornfields to waterfronts, rivers and cliffs. In order to replicate the diversity of these locations without repeating themselves, the team at Ubisoft had to create a selection of visual recipes, which the artists could then use to iterate and define the visual fidelity of each location. "These recipes, once optimised and approved, were used as templates to propagate throughout the game world," states Oros.

Although much of the developer's focus was placed squarely on carving out these natural landscapes, the cities – albeit less ornate than in the decorative Italian settings of *Assassin's Creed II* – had great effort poured into them to get the details right. "There is a huge difference between the architecture and buildings of the old cities in which previous *Assassin's Creed* games took place, and the younger cities of *ACIII*," says Ngo. "On its own the architecture of New York and Boston of the time might seem less interesting, so our real artistic challenge was bringing charisma to a fairly simple aesthetic. We dedicated our energy to bringing the streets to life, focusing on the living and breathing aspect of these cities by having a rich variety of crowds, animals, behaviours and unique animations. You see a big variety in scale between all living things – from large horses sharing the street with pigs and rats, to a big crowd of people with kids running around. The cities have truly become organic, living and breathing in their own right."

Game art revolution

Thanks to a huge repertoire of over 3,200 combat animations and the ability to cut and change between them fluidly, *ACIII* features some of the most visually stunning videogame combat achieved

The context-sensitive simulations during combat are stunning to see in action. For example, Connor can halt a move mid-swing, grab his enemy and use him as a human shield against incoming musket fire

Much like Rockstar Games' *Red Dead Redemption*, *ACIII*'s wild frontier is populated with a vast variety of animals, from rabbits and racoons to bloodthirsty cougars. All of these are animated with great skill

ANIMATED PERFORMANCE

Assassin's Creed's immersive open worlds may have set a new standard for the action-adventure genre, but perhaps not quite as much as the series' dynamic and believable approach to animation.

From the first time Altaïr dynamically scrambled up a fortress battlement or pirouetted around enemies in a balletic display of combat flourish, the expert animation of *Assassin's Creed* has entrenched itself in the minds of gamers. In *ACIII* this has been revisited afresh, with Connor's ability to free-run through the forest canopy, opening up new challenges for the team at Ubisoft.

"One of the primary mandates when I began on the project was to completely refresh the assassin's animation, which was quite a daunting task considering the pedigree set before," says animation art director Jonathan Cooper. "I don't believe in fixing something if it isn't broken, so we were initially careful never to simply replace an animation just for the sake of it. Every element of the movement, combat and interactions – including the crowd and animal life – has been added or replaced with the specific aims of making the gameplay more fluid and responsive."

> FOR THE FIRST TIME IN THE SERIES WE'RE DELIVERING THE HOLY TRINITY OF SIMULTANEOUS BODY, FACE AND VOICE CAPTURE FOR ALL OF OUR KEY SCENES AND CHARACTERS
>
> **Jonathan Cooper,** animation art director

In order to achieve this, Cooper and his team invested heavily in integrating a physics model and inverse kinematics rig on Connor's every footstep – an approach similar to one previously used exclusively for the climbing animations. "This allows Connor to turn on a dime or change direction mid-stride in a natural or believable manner, while importantly remaining grounded in a world that now contains many slopes in the frontier and high-vaulted roofs in the cities."

Not only was navigational animation overhauled, but also the combat. Connor swirls and dances around his foes as much as he hacks and bludgeons at them. His combat is a whirlwind of cinematic violence that, animation-wise, only *Batman: Arkham City* has come close to matching. "Whereas all previous games in the series involved the animators themselves getting into the suits, *ACIII* is the first game in the series where we worked closely with stuntmen and choreographers for the combat system mocap," says Cooper. "As such, we were really able to push the boat out in terms of the imagination and physicality brought to the numerous fighting moves and assassination flourishes."

It's not just the actions themselves that impress, but also the seamlessness by which they're woven together, with the repeated attacks from enemies often forcing Connor to switch stances mid-move or adopt new on-the-fly tactics. "We maintain that fluidity by ensuring that we create lots of coverage for most actions, such as blocks from every direction. [This ensures] they can play smoothly regardless of the initial footing of the assassin, or which direction and distance the enemy is attacking from," explains Cooper. "All our animations are cut up on export, allowing them to be smoothly branched to whatever input the player could require at any moment. There are over 3,200 animations for combat alone!"

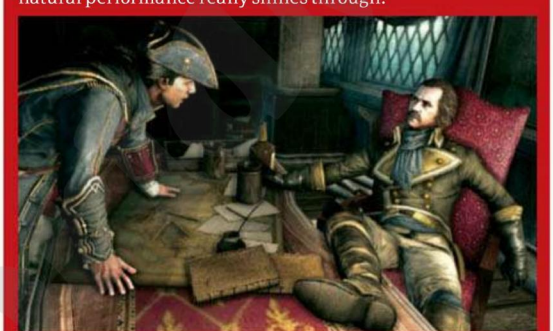
The team has consistently used 3ds Max for every project so far in the series, and stuck with it for *ACIII* to ensure consistency and speed in their work. Still, some tweaks were made to the cinematic-end of the pipeline. "We moved over to MotionBuilder in the early stages with the dual goals of maintaining a high frame-rate with multiple high-resolution characters interacting and ensuring as quick a turnaround between exporting and reviewing in-game as possible. I believe that, especially in the final stages of a project, such quick iteration makes the difference between a polished and an unpolished game."

FACIAL ANIMATION

Although facial animation started out as a passable but hardly noteworthy feature in 2007's Assassin's Creed, the importance of character and narrative in the series has seen the discipline grow into an increasingly integral part of each new game's development.

In *ACIII* a great many expressions and emotions are readable on the characters' faces during cut scenes, thanks to Ubisoft's proprietary performance-capture technology. "For the first time in the series we're delivering the holy trinity of simultaneous body, face and voice capture for all of our key scenes and characters," says Cooper. "This essentially involves cameras and high-quality microphones mounted to headsets, with software that can later translate this video back into information used to drive the various facial shapes on our characters.

"The acting really takes a big jump in believability when you can see the facial expressions match perfectly with the tilt of a head and the voice intonation," continues Cooper. "If you can remove as many of the various production stages as possible between the actor and what the player sees, the natural performance really shines through."



Assassin's Creed is now up there with the best of the best – such as *Uncharted, Heavenly Sword* and *Half-Life 2* – when it comes to convincing facial animation

Given that it's difficult to imagine a North American forest *without* snow, work on the feature began almost immediately, with a group of programmers dedicated to achieving convincing results

WATER FX

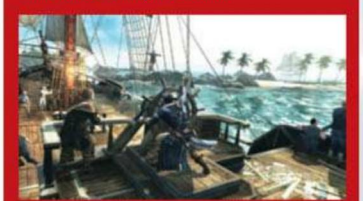
ACIII features water, but it's hardly the smooth-running canals of Venice or the aqueducts of Rome – it's the tumultuous, dangerous and crashing waves of the Eastern seaboard. Encountered during the game's naval warfare missions, the water here is a surging mass of salty spray, foam and surf that both looks and feels dangerous.

"The water in the *ACIII* naval missions is considered by most as the pièce de résistance," beams Oros. "Big props go to the Ubisoft Singapore team for this, who spent many months defining and refining the water system and rendering. Visual and physical simulations of waves were key both visually and gameplay-wise, and they did an incredible job with it, including reactions to weather and wind driven by the Beaufort scale.

"The water shading itself includes dynamic scene reflections, refraction, dynamic lighting from cannon fire, apex and reef foam formations – it's fully fleshed out," concludes Oros.

The water not only looks fantastic, but also drives physics simulations for floating ships and debris that provide both visual feedback and numerous gameplay challenges

Ubisoft Singapore is credited with helping achieve the incredible realism in the naval missions. A litany of factors impacting on the environmental physics – not least the weather and time of day – had to be carefully considered



The water in *Assassin's Creed III* contains a great many features that truly make it stand out, such as crashing white foam on waves or the surf that bubbles up to the surface

WEATHERING THE STORM

Effects in the first two *Assassin's Creed* games were clearly light on the ground, relegated to the odd explosion or spurt of blood. But even those were less noticeable than in most contemporary adventure titles.

ACIII stands out, then, for being the first title in the series to introduce seasonal changes and weather effects, with rain and snow having an impact not just on how the game looks, but also the way it plays.

"In defining *ACIII*, we knew that having a game set in the then-undiscovered North-American territory required multiple improvements to adequately portray the rich settings and believably wrap the player into them," says Oros. "Atmospherics such as volumetric fog, wind, precipitation, fully dynamic dry, rain and snow effects on all surfaces and assets were key elements we needed to develop to do them any justice."

Snow in particular played a large part in development. "We wanted to portray the harshness and difficulties of navigating the territory in the wild, before the existence of snow ploughs, shovels and global warming!" smirks Oros. "This was identified early on as a gameplay ingredient we wanted for both the player and non-player characters (NPCs), with the snow slowing down the navigation pacing and pushing the players up to the trees if they want to move faster."

> "ACIII STANDS OUT... FOR BEING THE FIRST TITLE IN THE SERIES TO INTRODUCE SEASONAL CHANGES AND WEATHER EFFECTS, WITH RAIN AND SNOW HAVING AN IMPACT NOT JUST ON HOW THE GAME LOOKS, BUT ALSO THE WAY IT PLAYS"

Another element introduced by the snow is deformable trails – something the player can use to track enemy NPCs around the game world (or vice versa). In order to get this feature just right R&D had to commence at a very early development stage. "The ambition was to have dynamically displaced trails over the entire four square kilometres of world, where NPCs could be tracked and NPCs could track *you* with a high level of persistence," states Oros. "The displacement snow tech uses the objects', characters' and animals' collision data to stamp down into the snow surfaces and collects this displacement data in the world – so basically every object can physically deform the snow. Earlier prototypes used up all the available memory of the consoles and ran extremely poorly, but over months of cross-platform optimisations and improvements to systems, we got the tech to work in mere megabytes of memory at low performance hits."

The Ubisoft development team has managed to get not only this believably deformative snow working on the current generation of consoles, but also the rest of the completely polished *ACIII* package – an extremely impressive accomplishment. The finished product looks less like one of the final games of this generation and more like the first of the next. Luxuriously textured, smoothly animated and lavishly detailed, *ACIII* very much stands as a first nod towards the cinematic graphical revolution coming to videogames over the next few years. We can't wait to see what follows.

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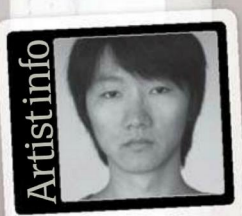


Artist info

RenPeng Dong

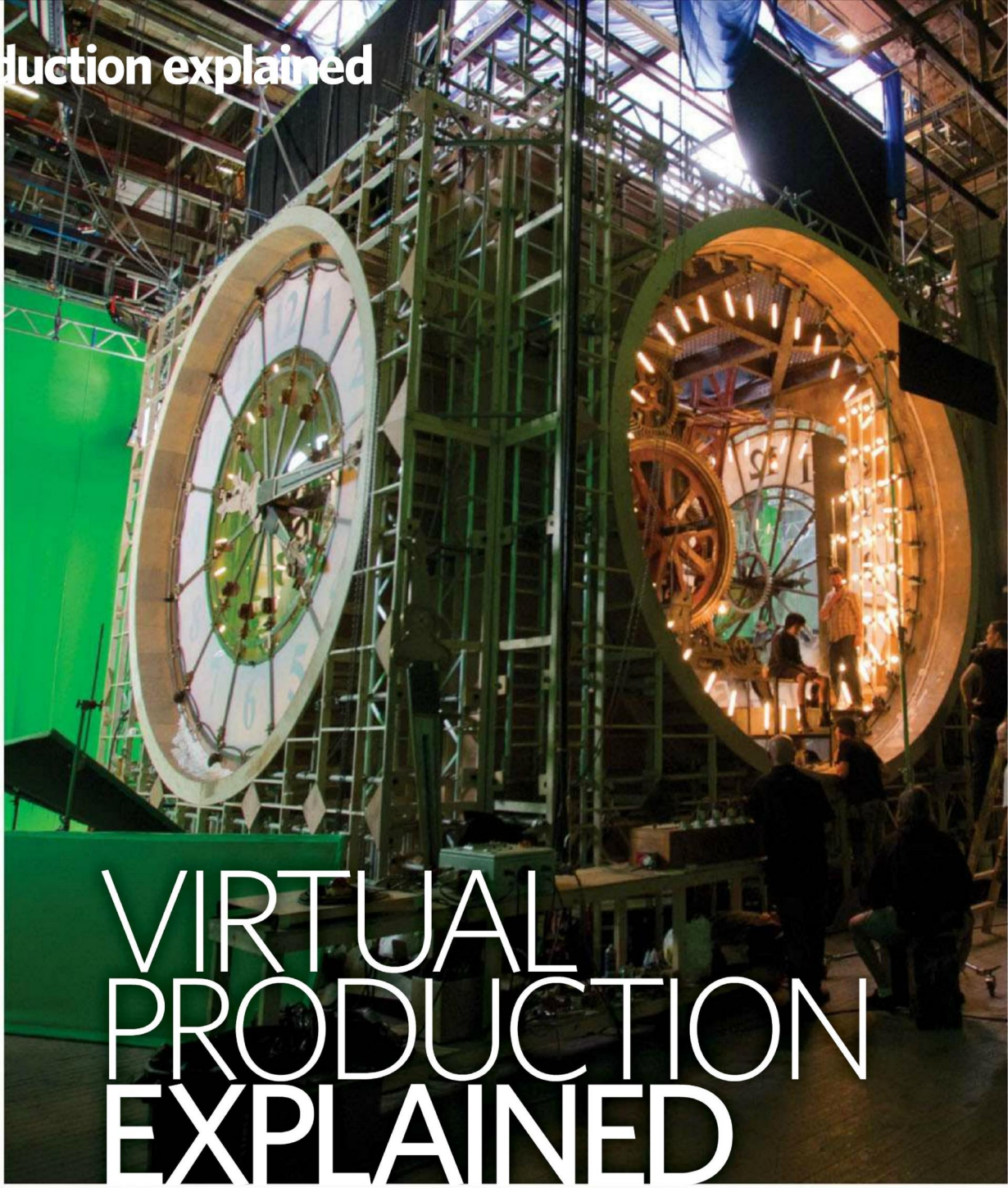
Personal portfolio site
www.oldrhyme.cgsociety.org

Country China

Software used
3ds Max, Maya, ZBrush, Mudbox, Photoshop, V-Ray

"I saw an image on a website that was like a kind of transparent man blending with his background, which brought me this great idea... [I] decided to show the feeling of part drying paint, part real, part plaster"

Non-US readers turn to page 94



VIRTUAL PRODUCTION EXPLAINED

Technologies used in filmmaking, animation and videogames are merging into a system for effects-driven tentpole movies that hark back to a classic filmmaking environment. We explore the tools and techniques used in virtual production Words: **Michael Burns**

Rob Powers, president of LightWave 3D Group, has a view that he admits is controversial: "VFX has been controlling filmmaking unnaturally," he says. "I think we've been working in the dark ages of visual effects for about 20 years."

As supervisor of the Virtual Art Department on 2011's *The Adventures of Tintin* and virtual environment supervisor and animation TD on *Avatar*, Powers can be allowed the odd controversial statement – particularly when the subject concerns virtual production.

This buzzword describes a collection of cutting-edge techniques in VFX-heavy filmmaking. It ranges from providing a film

VIRTUAL-PRODUCTION PIONEERS AND EXPERTS

Rob Powers
Role President of the NewTek LightWave 3D Group (previously the animation technical director for *Avatar*)
Company NewTek LightWave
Expertise Animation, virtual production, digital filmmaking and visual effects
Tools LightWave 3D

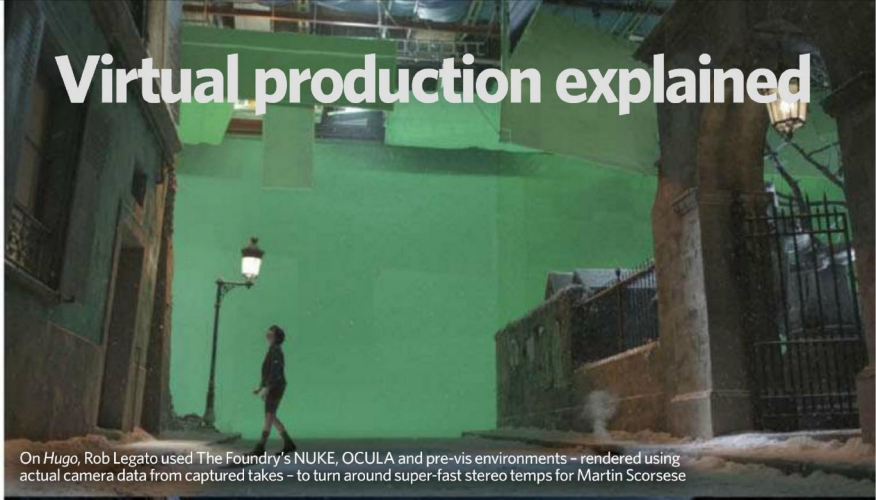
Bruno Sargeant
Role Senior product manager for virtual production
Company Autodesk Media & Entertainment
Expertise Virtual production, world building, pre-visualisation, performance capture, virtual cinematography and visual effects
Tools MotionBuilder, Maya, Inferno, Flame, Flint, Smoke, Combustion

Oliver Hotz
Role Visual-effects supervisor and studio owner
Company Origami Digital, LLC
Expertise 3D, 2D, tracking, pipeline development and motion capture
Tools LightWave, Maya, Fusion, Mocha, SynthEyes

Nic Hatch
Role Co-founder & managing director
Company Nvizage
Expertise Virtual production
Tools MotionBuilder, Ncam, Insight VCS, custom tools and systems

Seth Steiling
Role OptiTrack marketing manager
Company NaturalPoint OptiTrack
Expertise Motion capture
Tools OptiTrack mocap solutions

Richard Shackleton
Role Head of corporate and industry
Company The Foundry
Expertise VFX software
Tools NUKE, HIERO, MARI, KATANA, OCULA, modo

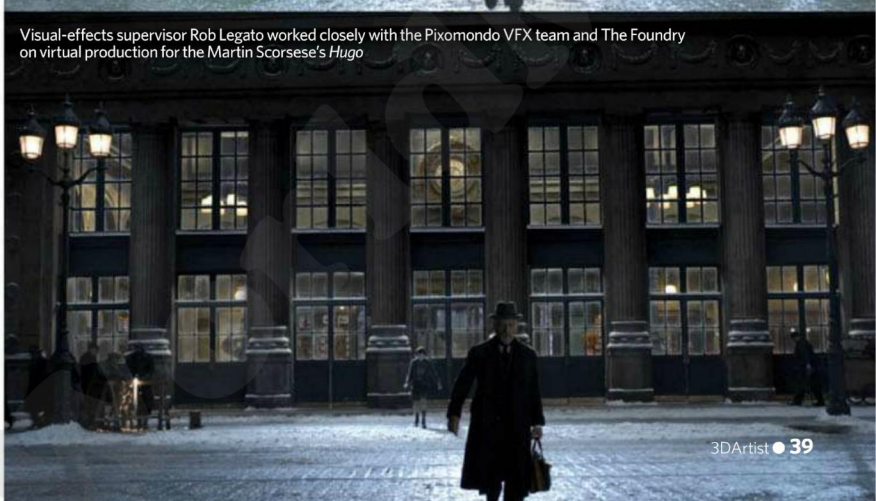


On *Hugo*, Rob Legato used The Foundry's NUKE, OCULA and pre-vis environments – rendered using actual camera data from captured takes – to turn around super-fast stereo temps for Martin Scorsese

VIRTUAL PRODUCTION PIPELINE

Virtual production fits throughout the pipeline, from world building to character development to pre-visualisation, virtual cinematography, performance capture and eventually visual effects. For an insightful article on how virtual production was put to use on *Tintin*, visit the Autodesk Area at **http://area.autodesk.com/tintin**.

Visual-effects supervisor Rob Legato worked closely with the Pixomondo VFX team and The Foundry on virtual production for the Martin Scorsese's *Hugo*



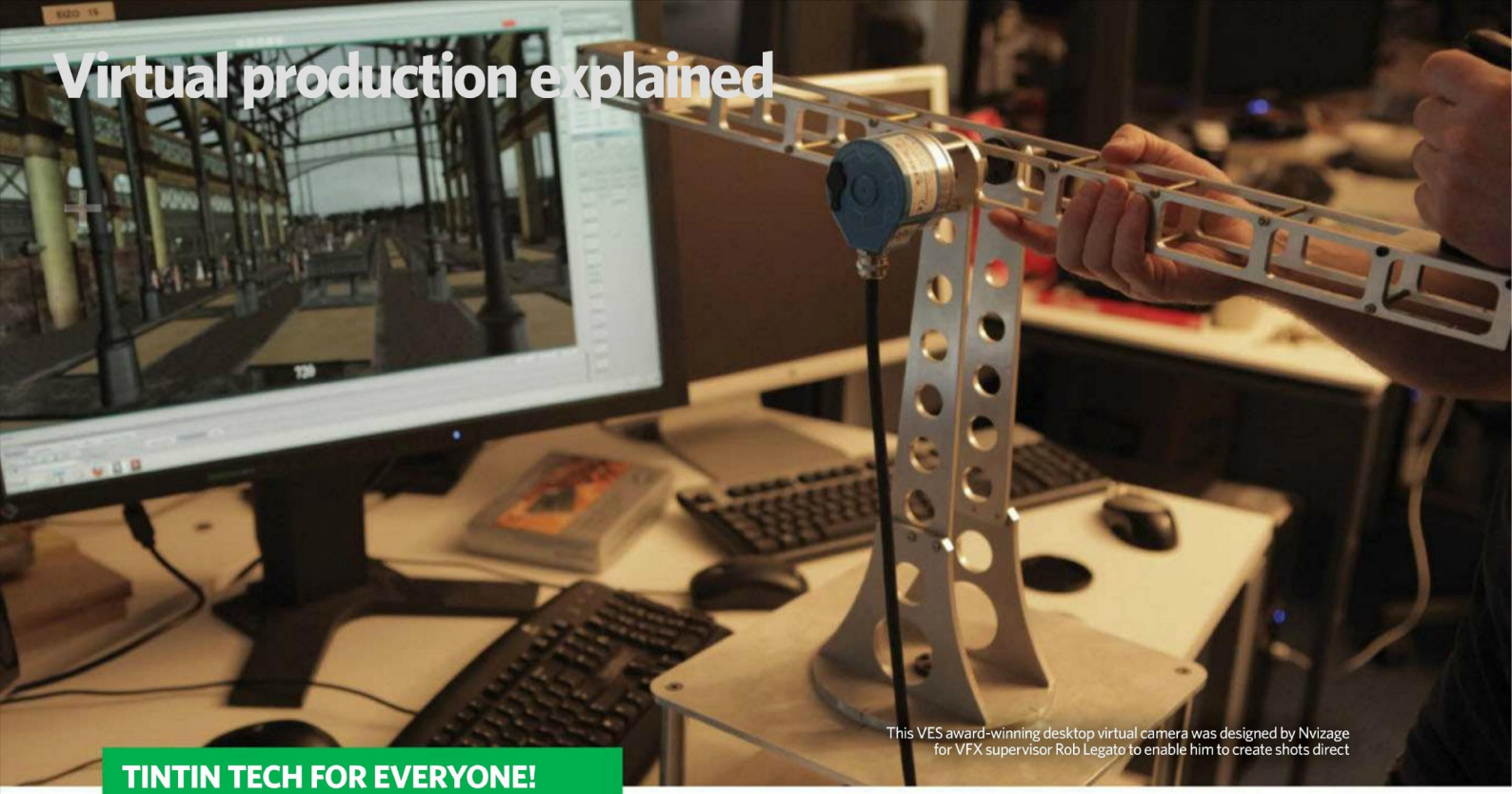
crew with a working virtual view of CG environments on the set, to enabling dynamic interaction between actors and virtual sets or CG characters, all managed in real-time by the film's director.

"Virtual production can be likened to the arrival of sound and colour in cinema," says Powers. "It's a rebirth of the way films are supposed to be made, in a way that live-action films are always made... Creative decisions are happening at that time – rather than eight months later when the actors aren't there and it's kind of a dead thing."

Powers adds: "It took Jim Cameron's level of funding and backing to pay for the R&D to be the catalyst. As a result it's sparked a lot of possibilities and ideas in a lot of other people's heads."

All *Hugo* images courtesy of Pixomondo. © 2011 Paramount Pictures

Virtual production explained



This VES award-winning desktop virtual camera was designed by Nvizage for VFX supervisor Rob Legato to enable him to create shots direct

TINTIN TECH FOR EVERYONE!

"[Virtual production] has gone from being bleeding-edge and inaccessible to all but the elite, to now being readily available to a broad range of studios and [even to] individuals," says Autodesk's Bruno Sargeant, who adds that the initial results of Autodesk senior production manager's recent partnership with Lightstorm and Weta Digital can be found in the software MotionBuilder 2013. "We did a significant amount of work around performance, so you could run MotionBuilder faster, load higher-density scenes or more-complex scenes much faster, so the turnaround time on the stage is significantly reduced."

MotionBuilder 2013 can also record takes to disk. "When you're shooting on-stage, the reliability and stability is critical," explains Sargeant. "So the system now records out to hard disk instead of out to memory. It writes it down to the Story Timeline and behaves like a non-linear timeline. Directors can record multiple takes in rapid sequence, layering them upon one another. You can record and play back simultaneously, and have the ability to capture multiple characters."

Sargeant adds that the software now includes HD SDI video output support, which enables MotionBuilder to be integrated into timecode-based studio video broadcast systems.

"There's also a new workflow with Maya called LiveLink where you can play out as MotionBuilder in real-time and have a character play out in real-time in Maya," he continues.

"There were certain tools that we knew had to be done, such as the ability to tear off a viewer to provide a custom viewport for the director. I know that's currently of benefit to certain movies in production now. There's also a heads-up display that gives custom data for a director."

A new option in MotionBuilder enables motion-capture data to be recorded directly to disk, rather than to memory

WORKING AT THE BLEEDING EDGE

"*Avatar* woke people up to virtual production," declares Bruno Sargeant, Autodesk product manager for MotionBuilder, virtual production and production management. "It wasn't the first movie to use it, but it's a significant milestone. When you look at what they did, a lot of it was through brute force, trying to get the technology to work."

At SIGGRAPH this year, Autodesk announced a technical partnership with Cameron's Lightstorm Entertainment and Weta Digital – currently following up its virtual-production work on *Avatar* and *The Adventures of Tintin* with *The Hobbit* trilogy.

"We rarely engage on that level as it's such a difficult thing to put together," says Sargeant. "Both those companies were working on the bleeding edge in an unproven area.

"They knew what needed to be done, but what they didn't have was a large team of engineers to implement it. Between us we've looked at the pipeline that needs to happen and we're building it. It's a very productive partnership, with an engineering-level dialogue to figure out complex problems. It was a case of trying ideas with them on stage, then very quickly iterating on those ideas, until we got the right solutions to take to market."

"It's coming together in pieces – where we've focused over the last year or so is on the on-stage piece of the pipeline," continues Sargeant, who adds that the first fruits can be seen in MotionBuilder 2013. "Another piece that binds it all together is the asset pipeline, where you create something at one end of the process, [usually pre-vis], and reuse that anywhere else in your visual-effects pipeline. If you can carry assets backwards and forwards, you're not always reinventing or having to re-create something that someone else made. First that's costly, because you're throwing stuff away and second it introduces error, because the interpretation might change."

Sargeant says that a lot of work is happening around file referencing and shared-asset stores. "You can then reference assets, or pass out different resolutions of the asset," he explains. "So if you're on stage, your primary concern is real-time. If you're in finishing, your primary concern is high quality. If you're in pre-vis you just want to put something together as quickly as you can."

It's not just LightWave 3D Group, Autodesk and partners who are involved. "Fox is now building a big pre-vis department that uses a lot of virtual-production techniques, so the studios are rallying behind it," offers Sargeant, as an example. "I think it's seen as a way to drive cost savings into filmmaking and to move decisions up front. It enables people to visualise what they are working on before they make the final frames. Basically, you can make creative decisions before you spend your money."

VIRTUAL MOVES IN PRODUCTION

Following the recent merger of The Foundry and Luxology, their combined portfolio of visual-effects products are set to contribute in many ways to the evolution of virtual-production tools and pipelines. That's according to Richard Shackleton, head of

> "Virtual production can be likened to the arrival of sound and colour in cinema"
> **Rob Powers,** president of LightWave 3D Group

New sci-fi web series *DRONE*, directed by Robert Glickert, enlisted Origami Digital to provide roughly 300 VFX shots for four episodes...

corporate and industry at The Foundry. He explains: "NUKE provides a flexible and fast visual-effects framework that can be templated and applied to varied on-set challenges, where live-action and compositing meet to aid the visualisation of an otherwise blank studio environment. modo also provides an ideal platform for rapid 3D-asset development."

In 2010, Sony Pictures Imageworks used NUKE compositing tools on set for *Alice in Wonderland*, while Martin Scorsese's *Hugo* (2011) – with 800 VFX shots delivered by Pixomondo – also benefited from this evolving workflow.

"With so much of the film's story hinging on the spectacle itself, it was vital that the team [could] easily comp rough stereo versions of the footage during the shoot," says Shackleton. "*Hugo*'s visual-effects supervisor Rob Legato and Pixomondo DFX supervisor Alex Henning spent three months working together on the *Hugo* set. [They used] NUKE, OCULA and pre-vis environments – rendered using actual camera data from just-captured takes – to turn around super-fast stereo temps."

Shackleton feels that the technology has its roots in the mocap-driven performance capture by Sony Picture Imageworks for director Robert Zemeckis' *The Polar Express* in 2004.

"*Beowulf* with live-performance capture and pre-vis in 2007, *Avatar* in 2009 and more recently *Real Steel* in 2011 are good examples that highlight the evolution of virtual production and how it's being used," Shackleton adds.

"Some of the key sequences in *Avatar* happened because the actor was in front of the virtual environments," says Rob Powers.

"The work on *DRONE* [included creating] 3D grenades, 3D scanning drones, as well as [creating] fully-CG environments and robots for the last shots," explains VFX supervisor Oliver Hotz

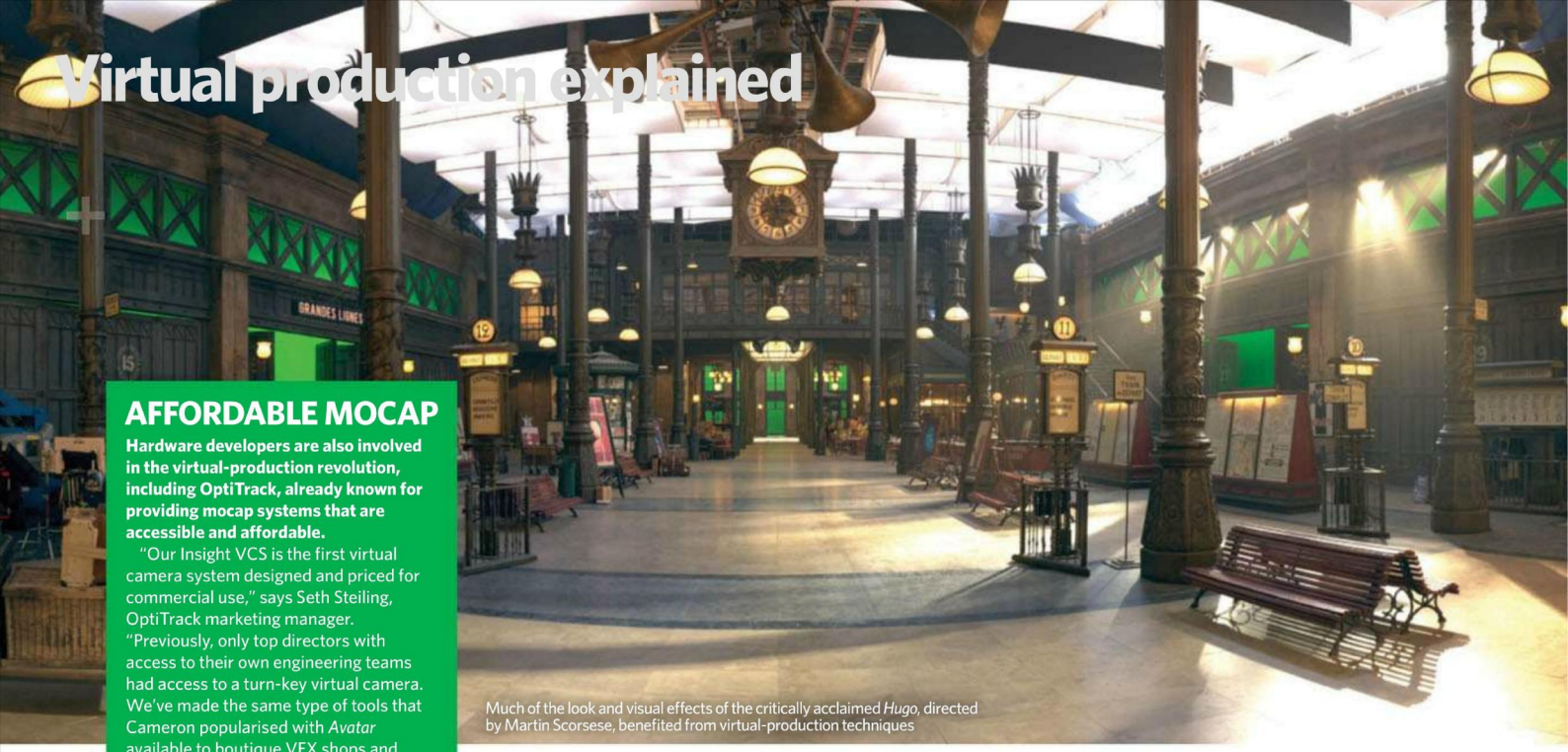
"He saw what his performance was doing, how he was interacting with this virtual world months, sometimes even years before work began in post-production for the final shots."

Powers reveals that, environmentally, *The Adventures of Tintin* (2011) wasn't as challenging to do as *Avatar* – alien jungles being more complex than our world. But the virtual-production technology still facilitated telling a story in a collaborative way. "Virtual sets have to be designed [in a] modular fashion," he says. "If there's a change to the set, you can fly a wall away, expand the room, change the furniture around really quickly in real-time, so you can facilitate those creative ideas as they come."

For *Real Steel*, DreamWorks' sci-fi robot boxing drama, Giant Studios and Digital Domain offered CG characters and actors performing next to one another, filming both live in real-time. As the filmmakers looked through the viewfinder they could see the actors in context with the robot characters.

Hotz first used virtual production creating pre-vis for *The Aviator*. "We used a pan/tilt/roll remote head connected to MotionBuilder at the time, to create realistic camera work," Hotz explains

All *DRONE* images courtesy Oliver Hotz



Much of the look and visual effects of the critically acclaimed *Hugo*, directed by Martin Scorsese, benefited from virtual-production techniques

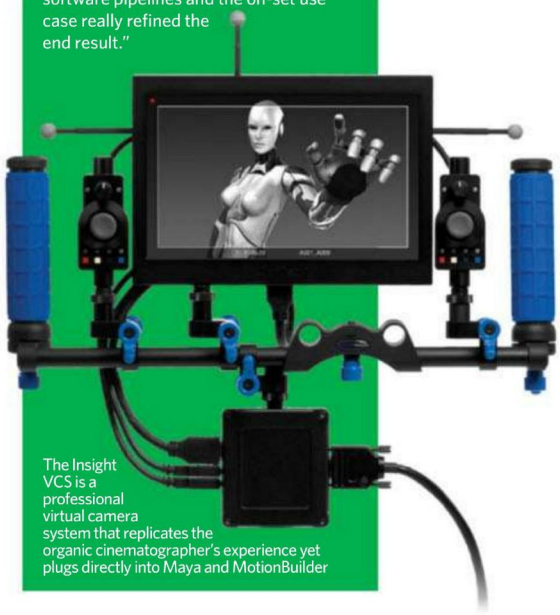
AFFORDABLE MOCAP

Hardware developers are also involved in the virtual-production revolution, including OptiTrack, already known for providing mocap systems that are accessible and affordable.

"Our Insight VCS is the first virtual camera system designed and priced for commercial use," says Seth Steiling, OptiTrack marketing manager. "Previously, only top directors with access to their own engineering teams had access to a turn-key virtual camera. We've made the same type of tools that Cameron popularised with *Avatar* available to boutique VFX shops and indie game developers around the world."

"While Maya is improving in its real-time capabilities, MotionBuilder is still the gold standard for retargeting and rendering real-time mocap data," says Steiling. "We offer real-time streaming of body and virtual camera data into MotionBuilder for a complete pre-vis pipeline with data quality worthy of production animation."

Optitrack worked with pre-vis specialist Halon Entertainment in the creation of the Insight VCS. "Halon are experts in virtual cinematography, with an emphasis on pre-vis, and they've been using our mocap tech for years," says Steiling. "Before the Insight VCS was released, they rigged up a DIY virtual camera solution to build out their OptiTrack-to-MotionBuilder pipeline. We loved their work and saw an opportunity to design a turnkey virtual camera – both to solve some of their pain and address a gaping hole in the market. We had a pretty good sense of where we wanted to take the product, but Halon's expertise on software pipelines and the on-set use case really refined the end result."



The Insight VCS is a professional virtual camera system that replicates the organic cinematographer's experience yet plugs directly into Maya and MotionBuilder

In *Snow White and the Huntsman*, Nvizage added OptiTrack's body mocap system to record footage of VFX supervisor, Cedric Nicolas

OptiTrack's virtual camera system was used by Nvizage on *Snow White and the Huntsman* to bring in six major sequences and over 320 shots

Snow White and the Huntsman © 2012 Universal Pictures, all rights reserved

BRINGING THE POWER BACK

London-based Nvizage has been involved in aspects of virtual filmmaking techniques since 2006 on *Sweeney Todd: The Demon Barber of Fleet Street*. One of its major triumphs was developing a bespoke, on-set virtual camera system for *Hugo*. Real camera moves were recorded on the set, driving and synchronising the motion of the virtual camera in real time. The same pre-vis assets and virtual environments were re-deployed as temporary backgrounds and composited through the greenscreen portion of the live image. The system has evolved into Ncam, which is currently being used on Roland Emmerich's *White House Down*, again in order to visualise virtual sets in real time.

"The system works with any type of camera," explains Nvizage's co-founder Nic Hatch. "Whether handheld, steadicam, dolly or crane-mounted – it needs no fiducials, tracking markers or set measurements. After a few minutes of setting up, the CGI can be locked to any type of live-action camera movement and it can be run from a laptop."

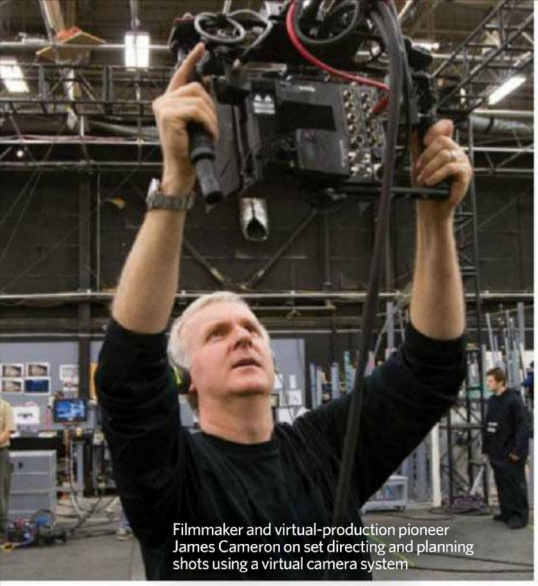
It's not the only system used by Nvizage. On this year's *Snow White and the Huntsman*, it deployed OptiTrack's Insight VCS to track the camera's physical position, enabling cinematographer Greig Fraser to visualise how live-action and CG elements interacted with one another in real time.

"This uses rigid bodies in a motion-capture system and a virtual camera to track an LCD screen," explains Hatch. "We feed MotionBuilder or Maya into the system in real time, so you can explore and make lens and shot choices. A lot of our pre-vis is done like this now; we'll build the assets, do the animation and provide that in a real-time environment. Then we'll bring in the director of photography (DOP), visual-effects supervisor or director and they will make the shots there and then on our system. We'll record that in real time and they can edit it to take away."

Hatch adds, "For me virtual production is all about wanting to frame up what isn't there. If you have a minimal set build and a bluescreen, you have no idea about framing apart from your actors, the tiny set build and the big featureless bluescreen."

"The problem with visual effects is you often end up trying to put your virtual objects and VFX into a plate that wouldn't have been shot or framed like that, had you been able to see it as a real picture in the first place." However, Hatch feels that the creative decisions of directors and DOPs are lost when the film moves to the VFX stage. "We're visual-effects technicians, not directors," he adds. "The virtual-production process gives the filmmakers the freedom back to make those decisions."

Virtual production explained



Filmmaker and virtual-production pioneer James Cameron on set directing and planning shots using a virtual camera system

Hugo © 2011 Paramount Pictures. Images courtesy of Pixomondo

MOVING AHEAD IN VIRTUAL PRODUCTION

"Ultimately this [area] will become real-time visual effects," says Hatch about the future of virtual production. "So simple bread-and-butter VFX will not be a post-process any longer. They will become a production process. As we shoot, we will do a production-quality key and feed in the visual effects in real-time. It will be recorded and graded and output as a finished shot. People are doing that kind of thing at the moment with virtual production on a very basic level, such as TV greenscreen work."

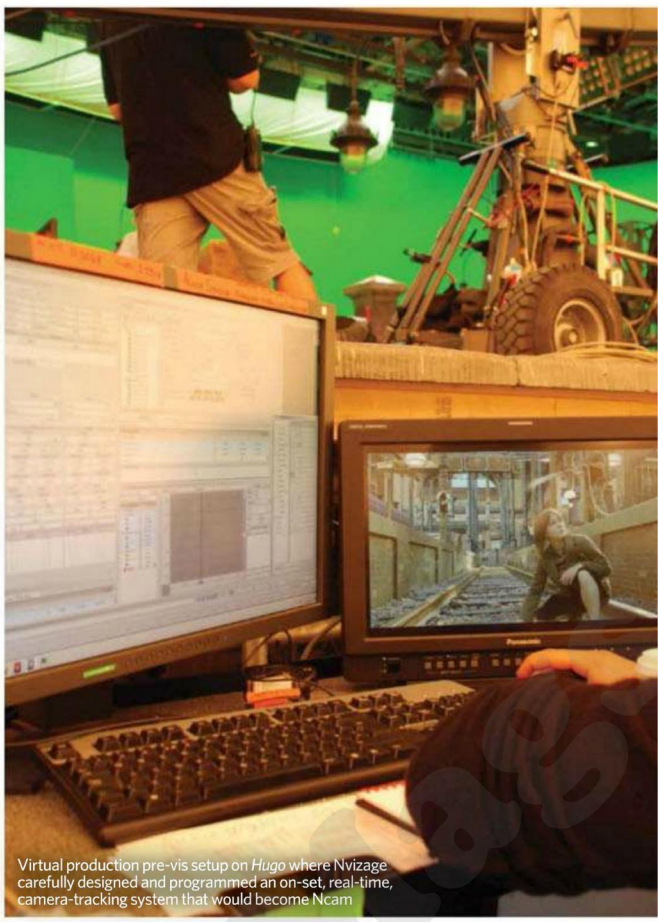
The Foundry's Shackleton illustrates the latter area with details about Zoic Studios, a heavy NUKE user. "Zoic has developed a pipeline of tools that will allow them to build photorealistic visual effects in near real-time – Z.E.U.S. [Zoic Environmental Unification System]," he says. "In 2009 they began to build the world's first primetime virtual production on a network scale for a TV show... Z.E.U.S. takes concept art from Maya into Lightcraft, back to Maya, back into NUKE and finishes it all in one real-time toolset. It takes shot-finishing times from days to hours."

However, Bruno Sergeant feels work is still needed in the camera area. "As soon as you have a camera that can handle real-time tracking and compositing as a standard offering, then virtual-production techniques will take off in live-action filmmaking," he says. At present you need a truckload of gear for it to work. That said, what you don't need is a million dollars. You can achieve similar results to the systems used on *Avatar* using hardware ranging from $300 to $5,000 – people are driving virtual cameras with a Kinect. You could get started for under $10,000."

"What we've put into LightWave is basically a plug-and-play solution, with three current options," explains Rob Powers. "[At the studio level] we have the InterSense camera system implemented natively with LightWave out of the box. When we used the InterSense with MotionBuilder on James Cameron's *Avatar*, we had to go through a lot of hoops just to get that set up. So we wanted to get rid of that difficulty for studios."

At the mid-level, LightWave offers integration with PlayStation 3 Move.me software and Move controllers for virtual walkthrough, lighting and camera control as well as the ability to drive virtual puppets.

"At the lower end, there's support for 3Dconnexion devices," adds Powers. "If you're doing virtual walkthroughs you can walk or fly through the set with these $99 plug-and-play devices, or control parts of a puppet. My goal is to make this technology accessible to everyone. You don't have to be Weta Digital to get into this."



Virtual production pre-vis setup on *Hugo* where Nvizage carefully designed and programmed an on-set, real-time, camera-tracking system that would become Ncam

HOW VIRTUAL PRODUCTION WORKS

The virtual production on Hugo involved several stages to achieve the optimal results

Pre-vis

Hired by VFX supervisor Rob Legato and GK Films, Nvizage started work on *Hugo* in April 2010. The studio designed a desktop virtual camera for Legato, enabling him to create shots first-hand, rather than directing animators and pre-vis artists to program the various shots themselves

Pre-production (Virtual Art Department)

Director Martin Scorsese used the desktop virtual camera to explore the vision of the railway station set and to make important production choices in advance of shooting beginning

Shooting (on-set)

Nvizage designed and programmed a real-time camera tracking system on *Hugo* called Ncam. Full-size camera rigs were encoded in exactly the same way as the desktop system and connected to a proprietary setup. Real camera motions were recorded, driving the motion of the virtual camera

The same pre-vis assets were re-deployed, serving as temporary backgrounds and composited through the greenscreen portion of the image.

DOP Robert Richardson could compose and frame shots while the whole shooting crew were provided with an accurate visualisation of the virtual sets all in real time

VFX supervision (on-set)

Pixomondo and Rob Legato used NUKE, OCULA and the pre-vis environments, rendered using camera data from the takes, to turn around super-fast stereo temps for Scorsese to approve shots

Post-production

The composite material from the virtual production provided first-class material for editing the film – without having to wait for temporary shots from the VFX!

I made this...

Incredible 3D artists take us behind their artwork

Artist info

Jeffrey Allen Severson

Website www.thirddimensionstudio.com/jeffseverson
Country US
Software used 3ds Max, nDo2, xNormal, Photoshop, UDK
Bio Jeffrey has six years of experience in the games industry

Software used in this piece

3ds Max | nDo2 | xNormal | Photoshop | UDK

"The props and debris are all mapped to a single texture sheet. [This] is a good habit to get into because it saves your texture budget in the long run. I used tiling textures on the wall, ceiling and floor pieces. I find that using tiling textures works well with modular pieces"

War-torn Interior 2012

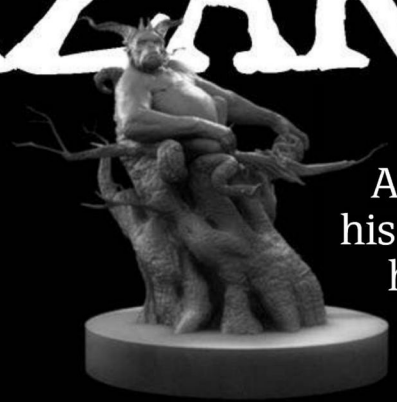
I love to create old, abandoned, beat-up, gritty environments that tell a story. Here I was inspired by a concept painting created by John Wallin Liberto. My goal was to stay true to his concept while giving the scene my own twist. It's helpful to invent a background story before creating a new environment. I find that having a story to go with the scene can really bring it to life.

"I find that working a story into your scene lends credibility to the believability of the environment. If you can look at this environment and start to wonder what might have happened here, then I feel like I've done my job as an artist"

"The fog volumes and dust particles were created using static mesh cones and an animated material. I created a smoke texture with dust particles in Photoshop and animated it along the length of the cone in UDK. The fog volumes are also set up to fade as you get closer to them"

"The hallway and rooms were created using a set of modular meshes. Each mesh can be snapped together on a grid to create any combination of rooms and hallways. Reusability of assets is key when creating a level or environment for a game"

WETA WIZARDRY



Digital sculptor and creature designer Andrew Baker reveals how a passion for his medium and honed ZBrush skills won him a role at Weta Workshop, where he creates concepts for high-profile films

Words: **Joe Nazzaro**

MEET THE EXPERT

Andrew Baker

Job title Senior creature and character designer at Weta Workshop Design Studio
Location Wellington, New Zealand
Website http://andbakerdesigns.blogspot.co.nz
Expertise Conceptualising and creating creatures and characters for the entertainment industry using 3D and 2D software
Film credits *The Adventures of Tintin, The Hobbit*

When Andrew Baker first read *The Hobbit* as a boy, he had no idea that he would one day be working with an A-list team of artists to bring Tolkien's magical world to life. As a designer at Weta Workshop, Baker has spent the past two years on the new trilogy – and most of that work remains strictly under wraps until after the first film's release. However, **3D Artist** couldn't resist chatting to him about the path that led him to such an incredible role on a high-profile film project like *The Hobbit*.

"It's the first job I got to work on as a designer," Baker explains. "It's taken years and years to get to this point. We've got three movies coming out over three years, so it's been a really long journey of design and redesign."

At first glance, Baker's personal work doesn't necessarily strike you as being particularly Tolkien-esque. For instance, his blog is filled with aliens and creatures, with not a single hobbit or dwarf to be found. However, this indicates his ongoing evolution as an artist, as he recalls: "When I first got the job at the Workshop, my portfolio was a bit more limited, but *The Hobbit* pretty much covers everything you're ever going to draw, sculpt or design as an artist. The reason I haven't ventured into that area in my personal work is because I've saved a lot of those explorations for the upcoming films. Obviously we've had a bit of down time here and there, but I prefer to explore things that aren't in the fantasy area, because most of my time has been consumed in the fantasy world."

Weta wizardry

> The Hobbit pretty much covers everything you're ever going to draw, sculpt or design as an artist
>
> **Andrew Baker**

Bapho the Ape Demon, created using ZBrush and Photoshop

CREATE THE COVER

Turn to page 54 to re-create Baker's fiendish character on this issue's cover!

All images © Andrew Baker

Richard Taylor commissioned a bronze statue of one of Baker's original characters – pictured here

Baker finds it easiest to start working from humanoid shapes

Baker is surrounded by inspirations and studies at his desk at Weta Workshop

> "Weta has got some serious history behind it, and the culture is one of encouraging other artists and bringing out their utmost creativity" **Andrew Baker**

Baker poses in front of his favourite cupboard at Weta Workshop: the bone cabinet!

EARLY INSPIRATIONS

Born in Zimbabwe and raised in South Africa, Baker and his family moved to New Zealand when he was a teenager, ironically right around the time the original *The Lord of the Rings* trilogy was taking shape. Although his father was an oil painter and his sister a painter/designer in the textile industry, Baker felt an artist's career was a long shot at best. However, he soon realised that computers were beginning to play a big role in terms of aiding graphic design and technology, so he enrolled at design school. "I got a four-year honours degree in Computer Graphic Design here in New Zealand, and even though the course was mostly centred much more around graphic design, they had a couple of guys knowledgeable in Maya and LightWave at the time and I got attracted by what those programs could do. I think ZBrush 2 was just kicking off around that time, so I started getting excited about the organic sculpting process in the computer and seeing it as a viable commercial tool."

Armed with a sketchbook, a degree in computer graphic design and a healthy dose of enthusiasm, Baker set about trying to forge his career. "I was extremely fortunate," remembers Baker, "because I didn't even have a formal portfolio. I [had always] assumed that concept designers were guys like Wayne Barlowe or Iain McCaig, who had been in the industry for years." Baker initially applied for a job at Weta Digital, where he found himself working as a pre-vis artist building sets for the animated feature film *The Adventures of Tintin*. It was while working there that a chance meeting one night with Steve Lambert from Weta Workshop Design Studio helped his work get seen by the head of Weta Workshop, Richard Taylor. After meeting with Baker, Taylor offered him a gig at the Workshop putting his 3D skills as a creature and character designer to exceptional use. "A lot of the senior designers became great mentors, who helped me work to the best of my abilities, so it was a great experience, but a combination of sheer luck and hard work," Baker recalls.

PITCHING CREATURES

Baker describes his process for successful concept designs

"The way I approach a design really depends on the line of exploration. If it's a humanoid character like a goblin or a troll, I'll generally start that straight in 3D because I know it's going to have two arms, two legs, generally two eyes, a mouth, a nose and ears, so there's nothing too surprising about the general silhouette. You can still play around with the proportions, so I find it quicker to tackle it in 3D straightaway.

"But if it's something where maybe there isn't a description for it, or there isn't anything that exists material-wise, I'll start in pencil just to get some shapes and ideas out there and have some sort of guideline about what I'm creating, whether it has got multiple limbs or whatever. That can often be three or four sketches, so then I'll very quickly explore this... in 3D, even if it's just to show the director something rough at that stage. Sometimes a director will look at a pencil sketch in the first round, but they very quickly want to get to the nuts and bolts, with the lens flare and all the other elements added to it."

Weta wizardry

Baron Faraii, of Wayne Barlowe's *God's Demon* created in ZBrush and Photoshop

> "[It] comes down to a sincere love for what you do, not what you can become… That's the most important thing"
>
> **Andrew Baker**

Sculpt of Baron Faraii, of Wayne Barlowe's *God's Demon*, created in ZBrush and Maya

Working at Weta Workshop is not only a great job, it also provides Baker with an arena to improve his craft. "Everybody is encouraged to work to their own strengths and explore their own ideas as designers. I believe that's what makes Weta unique," says Baker. "When a client comes in and asks for a design, they get [many] ideas and a lot of different directions. I've recently been made a senior designer, but it's definitely been standing on the shoulders of the giants that have gone before. Weta has got some serious history behind it and the culture is one of encouraging other artists and bringing out their utmost creativity."

WELCOME TO HOBBITON

After finishing an initial six-month contract at Weta Digital, Baker assumed he would be out looking for work again – never imagining he'd find himself in a job at Weta Workshop, working with a team of concept artists on the upcoming *The Hobbit* films. "I had the same attitude that most people have coming into the film industry, which is that you know how hard it is to break into, so you do whatever it takes," Baker explains. "On *Tintin*, I had no experience modelling sets. I wanted to get into characters and creatures, but they didn't have anything like that open at the time, so I said 'I'll model anything you want!' – and thoroughly enjoyed the experience. I was still doing digital sculpture in my spare time, [which] was what I ultimately showed Richard Taylor and that was what led to the new job. He was just getting digital sculpting off the ground at the Workshop and needed a dedicated artist to do that. Fortunately, that artist was me.

"At the same time, *The Hobbit* was knocking at the door as well and Richard had been travelling to a number of studios where he was witnessing the new revolution in concept design. [There are a number] of [effects] companies like K.N.B. [that] are well-known for doing physical maquettes for concept design, but directors were expecting… a ZBrush file they could push around until it became their design, which I thought was great as a commercial tool."

Working on *The Hobbit* was a dream job for Baker. Not only was he a fan of the book from childhood, but some of his early creative influences were also artists associated with Middle-Earth-related projects at various times. "I definitely read *The Hobbit* and I would have thought I was a *Hobbit* fan until I started working at Weta and realised what a real *The Lord of the Rings*/*The Hobbit* fan was! I do love the property and the world and I did read it as a young child.

"I'm probably going to get persecuted for this, but I never finished reading *The Lord of the Rings*. I just found it very long-winded as a kid. Prior to working at the Workshop, some of my influences were Alan Lee, Brian Froud and even John Howe, but Alan probably most of all has been one of my biggest influences character-wise. I've always been amazed at his pencil drawings, so his work on *The Hobbit* and seeing all the stuff he had done was definitely influential, as well as Petar Meseldžija, a Polish artist who does some wonderful fantasy stuff."

CREEPY COLLABORATION

One of Baker's more unusual pieces of work in recent years is a team-up of sorts with legendary artist Wayne Barlowe, on a 3D interpretation of Barlowe's painting *Faraii Acquires His Sword* for his book *God's Demon*

Baker recalls: "Wayne came down to do a bit of work here at the Workshop on a project I can't talk about, but he was dabbling in ZBrush and wanted a few tips, so I said I would try to turn the character of Baron Faraii into a 3D sculpt… We're still chipping away on that sculpt in my spare time. I think he appreciated my skill in that area and wanted to collaborate a little bit, so it was a huge honour."

"Andrew is a really nice, talented and earnest guy," adds Barlowe. "As a complete aside, when I first got to New Zealand and saw that he had a tattoo, I asked him where I could get a traditional Māori tattoo. It was Andrew's kind encouragement that gave me the mental horsepower to get the job done. It's really nice that he was so inspired by my work and I like to think I made a positive impact on the guys down there."

Weta wizardry

> I love removing colour and getting right back down to the soul of a character. I love creating that character with as few embellishments as possible, making it evocative
>
> **Andrew Baker**

An alien exploration. This creature was created using ZBrush and Photoshop

Baker puts his success down to luck and plenty of hard work

TIPS AND TECHNIQUES

Although Baker has embraced the principles of 3D concept art, he believes it's more important to remain creative, even intuitive, and to not get hung up on the technical demands of a design. "I find when you're trying to create something, you want to get that idea in your mind very quickly – especially if a director is talking to you about it. A pencil can sometimes solve the problem and a computer will bring it to life. For example, I love to create a bunch of different shaders very quickly in ZBrush, take them into Photoshop and just erase what I don't want. I know what I need to get to a certain point, as far as getting it painted, modelled, taken into Photoshop and bringing it to life."

Unlike some artists that prefer working with a large colour palette, Baker prefers monochrome and muted colours for the most part. "It's more of my personal taste," he says. "I've never been a huge fan of loud, bright colours, but saying that I love what they did with *Avatar* – even though that's never been the sort of art I've warmed to.

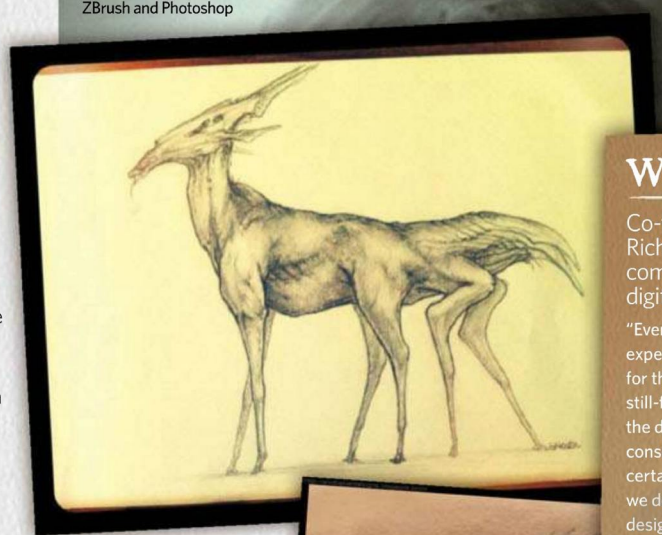
"If you look at Alan Lee's colour palettes, they're very watered down and I really like that, personally. That's not to say that at Weta we don't get pushed, challenged or briefed to do stuff with crazy, fluorescent colours sometimes...

"I prefer a more muted and monochrome colour palette. I love removing colour and getting right back down to the soul of a character. I love creating that character with as few embellishments as possible, making it evocative without having to put lots of horns or something glowing in the back of its eyes. I... prefer that aspect of art."

Regarding any advice for other young artists that might want to learn from his example, Baker warns against the danger of a rock-star attitude in concept design. "I think there is a lot of focus on the outward appearance and the pretty pictures," he explains. "My personal journey has come from a sincere approach to the process of art and not having any illusions that it's not hard work and dedication. If you ask any artist that's made it, they'll tell you they've spent every waking hour drawing, observing and studying other artists.

"I've learned that even getting the dream job at Weta Workshop was also my biggest learning experience. I remember sitting

Exploring a floral-headed alien with the idea of panels opening for a photosynthesis-type process. Image created with ZBrush and Photoshop



Baker prefers muted, subtle colour palettes

WETA INSIGHTS

Co-founder of Weta Workshop Richard Taylor offers a few comments on the process of digital creature design

"Every year, clients have a heightened expectation that the conceptual art we do for their films will be more and more like a still-frame from the film. Mostly gone are the days of a quick pencil sketch or even a considered marker drawing. This is certainly true of the creature design that we do and therefore our artists and designers that have mastered ZBrush are always in great demand.

"Andrew Baker, as our senior 3D conceptual designer, has more than mastered this medium. He has an uncanny ability to breathe life into the digital designs that he presents through his ZBrush skills, his innate understanding of animal physiology and the dynamics of the natural world go hand in hand with his creative inspiration.

"Andrew is a driven and focused artist that works at an intense level during the creative process. His work has been a huge addition to the amazing range of skills that our designers demonstrate when taking on the conceptual design work that we do."

Old Bugalugz the Giant. Digital maquette created in ZBrush and rendered in Maya

> "There is... a family culture at Weta Workshop that Richard Taylor has created, where you feel you're part of something and working towards something together"
> **Andrew Baker**

down with Richard Taylor on my first day; he showed me a Greg Broadmore drawing and said, 'Greg did this in a day'. At the time, I thought there was no way in hell I could do that in a day, whereas five or six years later I'm now [doing just that]. I think it just comes down to a sincere love for what you do, not what you can become. So that's the most important thing."

LIFE AFTER MIDDLE-EARTH

Having spent several years working on *The Hobbit* films, Baker admits it was useful to play around with very different personal pieces in his spare time – many of which can be seen on his blog – which helped keep his creative batteries charged up. "The fantasy side was getting well exercised," he agrees. "So it was all about getting out of the 'swords and sandals', as we call it at Weta, and into the science side, which is one my passions. I love UFOs and extraterrestrials, so that provided a very good break.

"But I'm also very fortunate to be able to exercise in that arena and then move on to another job where I am able to do something else, so I feel that's given me a creative balance. At Weta, we have a design team of about 20 at the moment that works on multiple projects, so we're able to jump in and out of different things. *The Hobbit* has been the big one, but I've been able to work on projects involving science fiction and aliens, so I feel very fortunate.

"There is also a family culture at Weta Workshop that Richard Taylor has created, where you feel you're part of something and working towards something together. And Richard does also encourage us, so if he sees a fine artist, he will commission a piece of their work himself. If you've seen my blog recently, there are photos of the bronze demon girl that Richard commissioned. I had already sculpted the piece, but he commissioned it to make a life-sized bronze, and he does that for many artists, because he expects us to be fine artists as well."

Baker is now hard at work on several top-secret projects for Weta, which he can't discuss in detail other than admitting he's moved from fantasy to science-fiction: "As I said, aliens and extraterrestrials are a passion of mine, so it's fun getting a chance to conceptualise some of those projects." But regardless of the work, he knows it's the job of a lifetime for any artist. "Whatever I did at university is almost dull compared to the university I'm at now," he reflects. "I know I'm doing a job, but it's almost like I should be paying for this [experience]!"

"I keep waiting for the catch, because I've got into this so young and not many people have got to this stage of the journey. As an artist, I know I'm not as rich in terms of the quality of work as somebody like John Howe, who's got all those years of experience, so I feel very humbled. Having worked with so many of the senior guys at Weta now, I'm ready for the long haul!"

Photoshop sketch of an elemental dragon

TAO, The Ancient One. ZBrush and Photoshop illustration for print

ballisticpublishing.com

Zombie Playground, Jason Chan, Massive Black

BALLISTIC PUBLISHING'S

MASSIVE BLACK

VOLUME TWO

For close to a decade, concept art studio Massive Black has created artwork, illustration, and animation for some of the biggest games, movies, and TV shows known today. This book is the second volume of their work available in print.

/ B A L L I S T I C /

With the Disc

- LayeredFile_Satyrguy_abaker.tif
- Merged_satyrFawnGuy_012.OBJ
- Satyr_renderFile_01.PSD

Learn how to

- ☑ Create a base for sculpting using ZBrush primitives and DynaMesh options
- ☑ Build up forms using simple brush combinations
- ☑ Pose a character using Transpose Master
- ☑ Build up the forms further
- ☑ Apply texture and detail
- ☑ Tackle composition
- ☑ Render for presentation
- ☑ Use rendered layers
- ☑ Finish with post-production

Software used in this piece

ZBrush Photoshop

Concept

The aim of this tutorial is to create a fantasy satyr-type character. I want to create an overly stylised face for a fantasy genre that can be rendered realistically and create impact.

The art of Weta character design

The Satyr 2012

Learn to use ZBrush to create a fantasy character portrait, following the principles of Andrew's 3D character conceptualising workflow at Weta Workshop

Andrew Baker is a senior character/creature designer at Weta Workshop Design Studio in New Zealand

A bust or portrait is always a great place to start visualising a character. ZBrush enables us to conceptualise an idea to an extremely high level relatively quickly. We no longer have to go through an arduous technical process to create an effective, realistic-looking 3D character.

Without getting too focused on the technical aspects in the 3D process, I'd like to show how I generally start conceptualising a character by creating a bust and portrait. Due to the speed at which I execute such refined work, this is where I begin the conceptual stage of my project – often, in essence, cutting straight to the point.

behind the scenes

3D artists explain the techniques behind their amazing artwork

Artist info

Andrew Baker

Personal portfolio site http://andbakerdesigns.blogspot.co.nz

Location New Zealand

Software used ZBrush, Photoshop

Expertise Creating and conceptualising characters and creatures for physical and digital pipelines

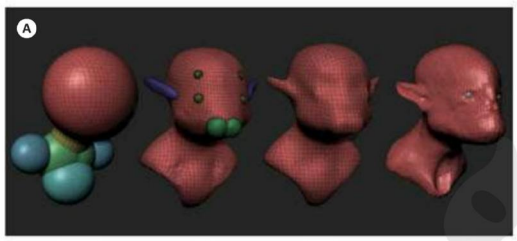
Conceptualise with digital clay

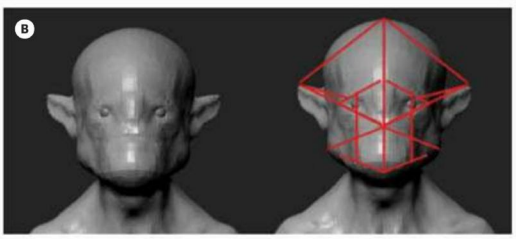
Get started on the sculpture in ZBrush

Using DynaMesh wisely

I start using DynaMesh on a very low level. In this case I have it set to 48, but depending on how large your model is the resolution will differ. At the early stages it's almost like what you do with sketching: blurring your eyes to start visualising where the forms are, and quickly laying down broad strokes to find the design. DynaMesh is extremely useful at this stage and can be used in the entire sculpting process. However, I prefer to use it as a base generator and subdivide further. Later I want to be able to drastically pose this character, so having a lower subdivision level helps with this.

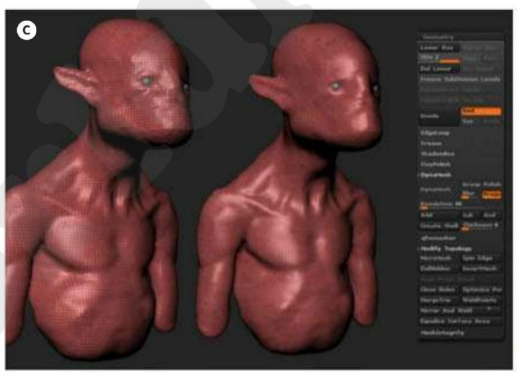
01 Use primitives to establish a base Traditionally, it used to be quicker to start a 3D sculpture from a base mesh you had already created. I've always found this process a bit limiting on a conceptual level, though, as you are technically pushing and pulling a volumetric shape – it feels constraining. All of my design sculpting now starts from a sphere. With the use of Insert Mesh brushes and DynaMesh I can experiment with different shapes before locking into the base I'll use to finish the sculpture on. Once I've got enough primitives there to manipulate, I use DynaMesh at a low level of 48 and start sculpting A.





02 Design considerations I create several lines to highlight relationships on the face. The ears line up with the eyes to the point of the nose and from the nose outwards to the edges of his jaw. I generally think of character faces in triangles that are largely based on humanoid configurations. This can be pushed as far as you like – for example huge noses, tiny eyes, massive chins. It's a game of consideration. Be aware of what's working and what isn't. This will be the design base for the following steps B.

03 The right geometry With this sculpture we're trying to be fast, but effective. My goal is not to create a production model; however, ZBrush still enables you to create a high-res sculpt really quickly, so it's worth having enough geometry to get you there. I find it's essential to get as much information in the lowest subdivision level before subdividing, so that I won't need DynaMesh again. I keep design elements like horns and eyes on a separate SubTool to move them independently if I need to. I subdivide twice at this stage to begin sculpting further C.



A Using primitives with the Insert and Move brushes to manipulate my base

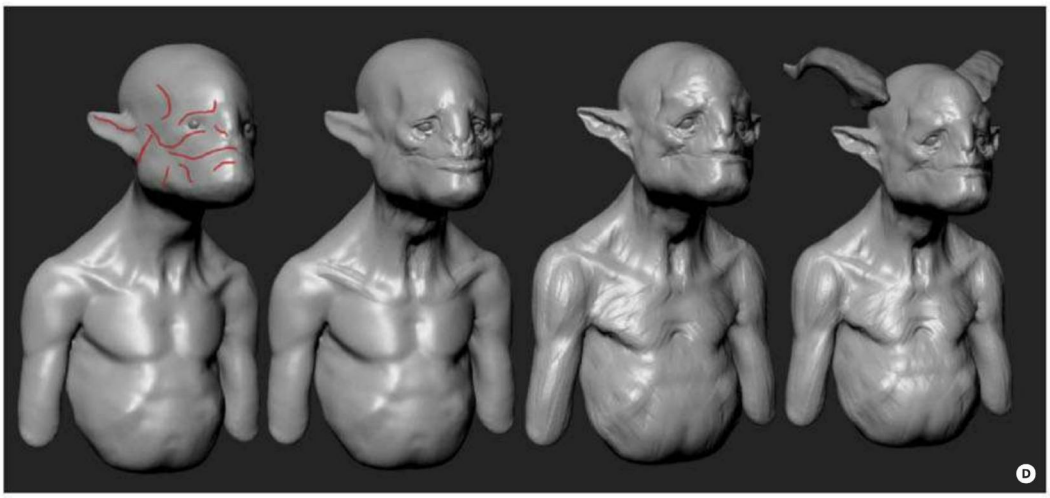
B My plans in regards to the nature of the face I want to eventually create

C The DynaMesh base created, with more subdividing needed to move it on further

Form, texture and pose

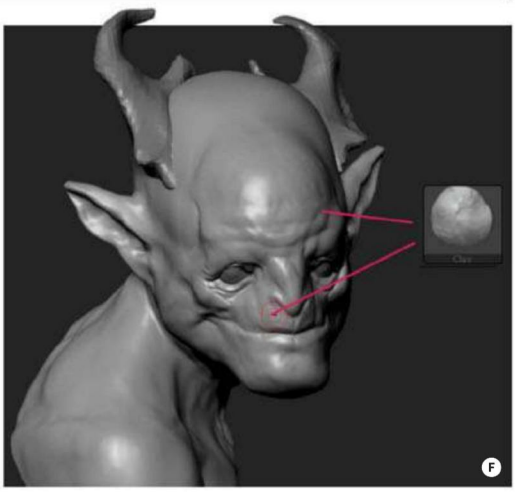
Let's get the character into pose and refine the sculpt

04 Build the forms Now, with some extra subdivision levels, I build up some of the forms. Using the Clay Buildup brush I want to create direction for the surface and build up some secondary forms. Doing this on one of the lower subdivision levels can create some nice organic effects on the upper levels. I often switch between the lower and higher subdivisions at this stage to play with the options a little. I want to create a drastic pose for this character, looking over his shoulder, so I don't want to get too precious about any forms at this stage, but rather block out the basis for his personality D.



05 Put the character into a pose As our end goal is not a symmetrical production model, I want to pose it right away. I have a clear idea of how I'd like to present this character, having him look over his shoulder to create an asymmetrical bust and an interesting view for the portrait. I use Transpose Master to generate the pose. Be as bold as you can! It's important not to marry to any forms at this stage and let it come out in the posed maquette. I also sculpt into the mesh while transposing, trying to fix any broken anatomy as I go E.

06 Tighten up the forms Now that the model is posed and I have some higher subdivision levels, it's about refining those secondary forms, like the cheekbones, lips, brows, eye sockets and so on. For me, there's no better brush than the Clay for this. It creates very nice crease lines, which can start as the base for our wrinkles. I find the Clay brush, if treated right, can give some nice results to the higher subdivision levels, using the Smooth brush to soften where needed. I also play with the shape of the horns, considering how they affect the overall silhouette more, now they're on the posed character F.



Top shaders

Using different shaders is a great way to tackle certain aspects of your sculpting and colouration. For my primary forms, I prefer to use a shader like MatCap Grey, which shows the forms off really well. When I start my secondary forms, I turn on the Blinn shader, as this has a nice general specular highlight, which is also good for showing the detail. I flick between that and MatCap Grey. The Skin Shader default is awesome for colouring flesh-toned characters, and I use this a lot for my concepts as it displays really well.

D Build up the forms, keeping the design base and appending some horns

E Mask and transform the character, while sculpting and fixing broken areas

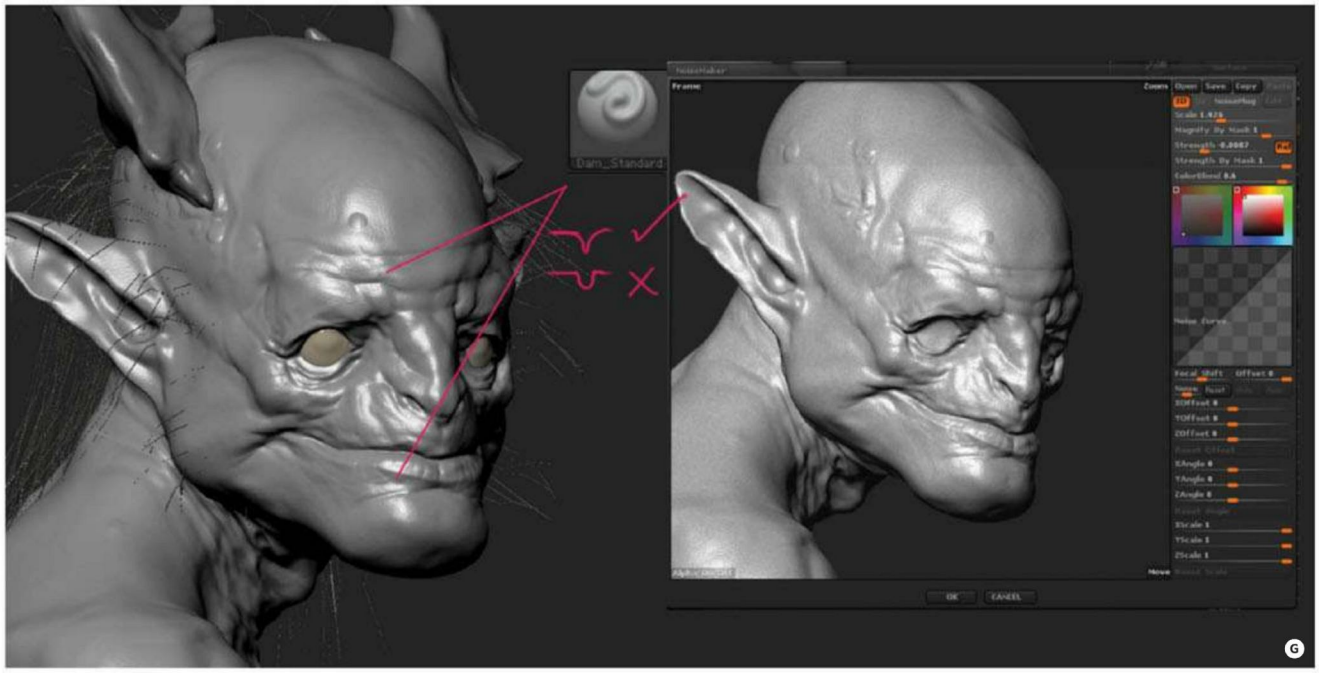
F Build up secondary forms and detail the horns

G Sharpen details and add some surface noise

H Use a scattering effect on the brush, adding in some extra pore detail

I Layer up the colour of the character, masking the cavities and washing over the top with a base colour

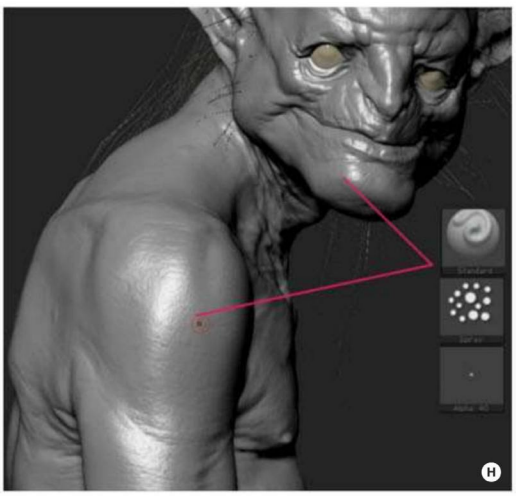
J You can still tighten up the details with your sculpting brushes as you apply colour



G

07 Detail and texture

I am now happy with the secondary forms and can start to see where my detail needs to go. DamStandard is my new favourite brush for going into these soft forms and giving them some sharpness. They fold into the surface and create a pinched, V-shaped crease, instead of a U-shaped crease like the normal Standard brush makes. I also add a noise pass to create the pore effect on the surface. Playing around with the scale and intensity of the noise function can create awesome pore- and skin-like textures. Experiment with this feature to really get a grasp of just what it can achieve G.



H

08 Pores and extra texture

To create another level of focused noise in areas, I use the Standard brush with a Scatter effect and a very small Point Alpha. I turn the Z Intensity slider quite low and increase the size of the brush and intensity as needed, especially on the shoulder and chin areas or anywhere I think a specular highlight might appear on the final piece. I also use DamStandard with a really low intensity to create very fine wrinkles, going in the direction of the skin compression H.

09 Add some colour

As colour will greatly affect how our texture is shown, I want to start adding that in, treating the detail of the surface and colour now at the same time. I start off by adding a very light base colour, covering the whole model. I use the default skin shader as this shows up colouring for skin very well – and all in real-time. I layer up the model with reds, blues and yellows for the underlying blood vessels to wash with a flesh colour and soften in areas. I also mask out the cavities to add some dirt I.

I

10 Refine detail with colour

Because ZBrush enables us to affect the form while adding colour, I go back to my DamStandard brush, turn the RGB down very low with a brown colour and start to tighten up some of the wrinkle details. I also use the Inflate brush to push all the details tighter together J.

J

Final touches and presentation

Finish the painted sculpt and get it ready for maquette presentation

11 Add the hair

Another hugely innovative tool from ZBrush is FiberMesh. This is a great addition to the process as things like hair really add a nice touch to a character like this. By simply masking off areas where I want there to be hair, I turn on the FiberMesh button and begin to adjust to the different hair I'd like to add. I want some variation in the hair around him, but I want it to be quite thin, sparse and wiry K.

12 Get creative

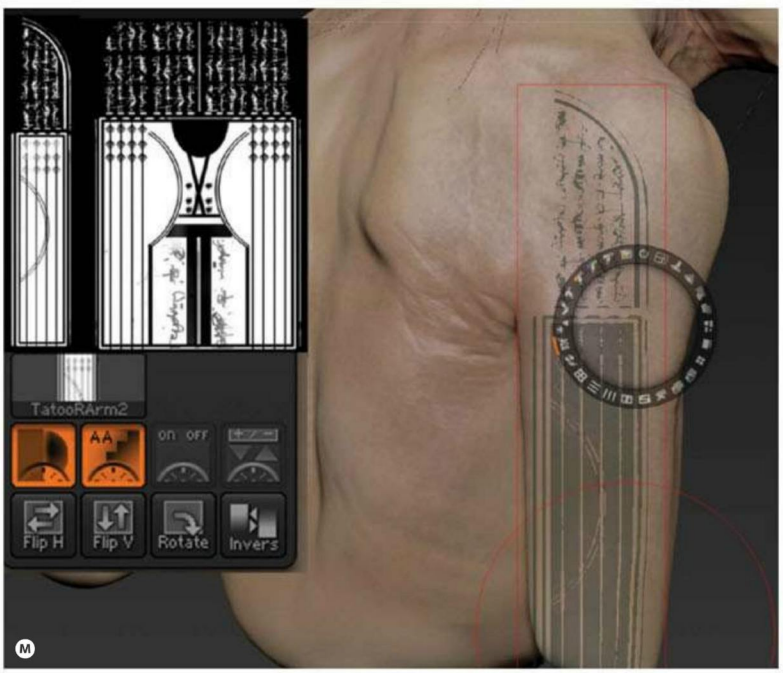
Without going too far and crashing your machine, you can have a lot of fun creating different hair around the face. Masking areas like the tips of the ears is a nice touch, I find, while creating some scraggly sideburns can also be effective. There are lots of options to play with, so I suggest spending some time to get used to what's possible. I always take time to manipulate with the brushes afterwards, so I can be sure to create a much more effective look L.

13 Give him some ink

I want to add another element to this character that isn't necessarily a costume accessory. I'm thinking of a large religious-style tattoo on his back. I create the tattoo in Photoshop as a flat template then use Spotlight in ZBrush to project it onto my character. Spotlight is another great way to project any other further texture onto characters M.

Paint-over tips & tricks

Depending on how long I have to get an image done, I sometimes spend a bit of time playing with the hair and positioning tattoos. These are often things that can be explored in 2D for conceptual pieces, but it never hurts to have something 3D there for the final render. All of what's been done so far has been done very quickly without getting too consumed with technical aspects. If it's not working in 3D, solve the idea quickly in 2D by doing paint-overs before committing to the 3D render. This can also be really handy to show a client for variations.



K Mask off areas on the head where you want to create hair

L Add different types of hair around the ear

M Use ZBrush's Spotlight to apply the tattoo created in Photoshop. Adjust the hue and opacity before applying to the model so it blends in correctly

N Some layers rendered in ZBrush to take into Photoshop

O A layer rendered out in ZBrush for Photoshop blending

P The final ZBrush layers composited in Photoshop

Q Give the final image some post-production work

Compose the final image

Render and capture the essence of the sculpture in post

14 A perfect comp Having the composition in mind from the beginning will certainly help you get to this stage quickly. This way there's no unnecessary sculpting and the entire process is geared towards aiding what we want to show. I aim to create an interesting pose that isn't front-on to the character, thereby enhancing his silhouette a little. Having the sculpt turned to a grey shader (Blinn, in this case) and doing some quick BPR renders with the main light source will also help us judge how best to compose the character. I create my document in portrait at about 1,310 x 2,050 pixels, which will be the final crop N.

15 Render out layers for post Once I've established my main light source, and the shadow that is created by looking at the BPR render passes, I start to look at what else I can take to Photoshop to help this image along. I render out a lot of different light passes on the various standard shaders turned to black. I use the BPR render passes, a cavity and reflection pass. For SSS I use a standard shader set to red and amp up the ambience. Then I just need any shader that looks like it might do something interesting in Photoshop O.

16 The final composition I generally experiment a lot with blending options on the passes I've rendered out. Because this guy has human skin and I've painted the model, the initial render gave me a lot to work with. This is the great thing about this process and leaves us a bit of time to spruce up the image. Using the Z-Depth map and changing the colour while turning it to Overlay can create some nice depth effects. Reflection and Light maps can be used to create interesting effects for the eyes, too. At this stage, be experimental and have fun P.

17 Post-production Once I'm happy with the blended layers, and they're all doing what I want, I can really start to have some fun. A background can be used to make the image look more of a studio shot or something more photographic. As this image could be used as the base for many design passes, I'm not shy about painting over areas that need further attention – even using photographs – although I only ever use photos to add noise or textures where I can. Sometimes it's unavoidable, but if I'm sculpting a character like this, there's really no need Q.

Layering your shaders

It's vital to experiment with different shaders and effects in ZBrush. There's no limit to the variation of materials and textures you can create in ZBrush without the use of photos or alphas. Designing and creating characters in 3D and getting realistic results doesn't have to be a laborious process anymore. Also, keeping a library of references will always aid the creative process and arm you with a catalogue of ideas.

5 hours creation time
Resolution: 2,953 x 4,584 pixels

I made this...

Incredible 3D artists take us behind their artwork

Artist info

Michael Nugroho

Website www.nstu3dio.deviantart.com
Country Indonesia
Software used AutoCAD, 3ds Max, V-Ray, Photoshop
Bio Michael works as an interior designer and 3D visualiser

> The blanket and pillow were created with 3ds Max's Cloth Modifier. It takes a lot of trial [and error] to achieve realistic cloth. Sometimes you need a lot of creativity to make a good cloth object – even with a simple tool

Software used in this piece

AutoCAD · 3ds Max · V-Ray · Photoshop

bed.room 2012

The reason for making this scene stemmed from my dream as a designer to have a house in the countryside with an attic where I can do my brainstorming. I want it to be a place that is full of design books to help me come up with ideas. It's also a place that can be cosy – to listen to music or watch a movie – with a comfortable bed to take naps!

> The [realistic, wooden] floor was made with the FloorGenerator 3ds Max script and textured with MultiTexture by CG-Source.com

I added some chromatic aberration for lens correction and a glow effect from the sun to add a warm feeling to this scene. These steps were made in the post-production process using Photoshop

FIND **FREE BOOK MODELS** FROM **CGAXIS** WITH THIS ISSUE'S DISC

The book models came free from www.3dmention.com. To randomise them I used the BookScatter 3ds Max script by Moure (www.scriptspot.com/users/moure). It's [so] easy to use!

20 steps to better environments

Consumed 2012

> The concept for this image came from wanting to create a piece dedicated to a person who lived below my apartment, who suffered from Alzheimer's disease

Toni Bratincevic is a senior environment modeller at Blizzard Entertainment in the Cinematic department. He's a self-taught 3D artist with almost ten years of professional experience

This tutorial will cover the making of *Consumed*, focusing mostly on my personal approach to the modelling process. I will show how basic modelling is done in 3ds Max using some simple techniques, and how ZBrush is used to sculpt the character and additional objects featured in the scene.

To finish up I will quickly go over some procedural texturing techniques to add dirt layers on wood and will show you how V-Ray RT can be used to set up lighting in an interactive way.

I'm using ZBrush primarily as my sculpting tool, but I also often rely on its texturing and UV unwrapping tools, as well as its geometry optimisation tool, Decimation Master. So let's begin!

behind the scenes

3D artists explain the techniques behind their amazing artwork

Artist info

Toni Bratincevic

3DArtistonline

Username: InterceptoV

Personal portfolio site
www.interstation3d.com

Location California, USA

Software used
3ds Max, Photoshop, ZBrush, V-Ray RT

Expertise Toni works with environments professionally, and is currently focusing on character modelling in his spare time to introduce more variety into his portfolio

Learn how to

- ☑ Establish a layout
- ☑ Create detailed models
- ☑ Sculpt in ZBrush
- ☑ Tackle procedural texturing
- ☑ Set up lights with V-Ray RT

With the Disc

Find screenshots of Toni's detailed edits, including his render settings

Concept

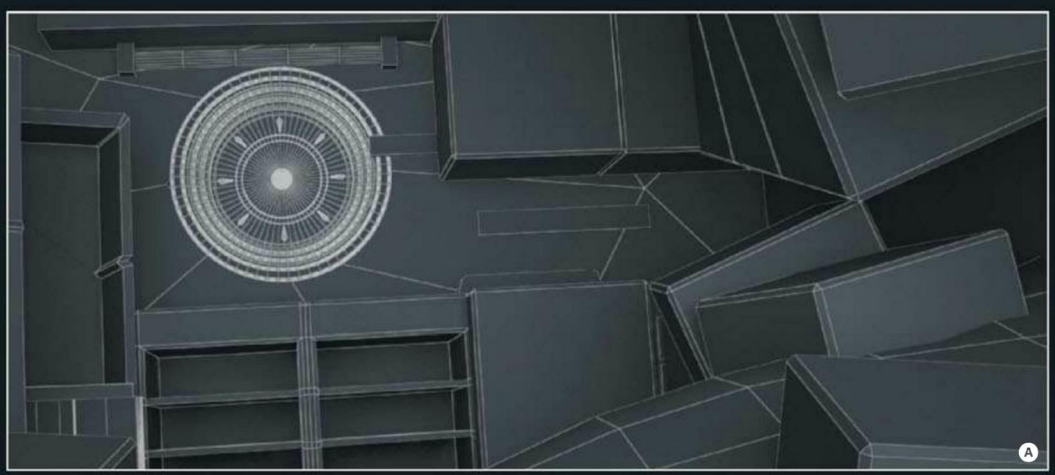
A basic concept for this image was drawn on paper with pencil a few years ago. It was just a simple sketch that captured the general idea. I later added colour in Photoshop.

Software used in this piece

3ds Max · Photoshop · ZBrush · V-Ray RT

Start the layout and modelling

Establish the scene and create models for the environment



01 Scene blocking After gathering my various pencil sketches together, I set up the basic layout of the scene and stage the camera. This step takes me around ten minutes. I'm not wasting time keeping topology clean and making good UVs. At this point I'm starting most of the objects from a simple box and using poly-modelling tools like Cut, Extrude, Bridge and Connect. I'm aiming to model all objects that will serve as starting points for the high-poly modelling. It's also during this stage that I define the basic camera position so that I'm building the scene based on what I see. I will also establish the basic composition during the process (A).

(A) Simple objects to stage the scene and build the layout

(B) The basic lighting setup to check which objects are more in focus

(C) Models from the layout are exported into separate assets for detailing

Always be prepared

The first steps are usually the most important when creating an image – especially one that is more complex. These are the stages where everything is established in a broad sense: the composition, distribution of objects, forms, basic light setup and colour correction for the final image. It's essentially a simplified draft version of what the end result will be. After this point it's just a matter of being patient and detailing all the objects, textures, materials and light to bring the image to the final version. If you don't feel comfortable with the layout you've completed and you can't imagine it as a final work, then try starting from scratch and beginning everything again in a different way. Imagine this process as paving the way to the final product – after which you only need to take steps forward!

02 Basic lighting Next I establish the overall lighting of the scene. Although some artists tend to create lighting in later stages, I usually decide to work on it as soon as I create the layout. Lighting – along with camera view – will define what parts of the scenes are more visible, what will be in focus and what I should concentrate my time modelling and texturing. This basic lighting is done with a couple of V-Ray area lights. One light uses a warmer tone and serves as a primary to illuminate areas where the character should be, while others are used as fill lights with cooler colours (B).

03 Organise assets I prepare separate files and model objects for the scene. The fridge, which in layout was a simple re-modelled box object, is exported to a separate scene named 'Fridge_V01_01.max' where I can re-model and detail the object. The layout model of the fridge is positioned to fit the layout scene but when I export this placeholder object into the new scene I reset all the transformations so it's positioned at the origin where I did all the re-modelling. I merge this model back into the original scene and align it to the layout model of the fridge (C).

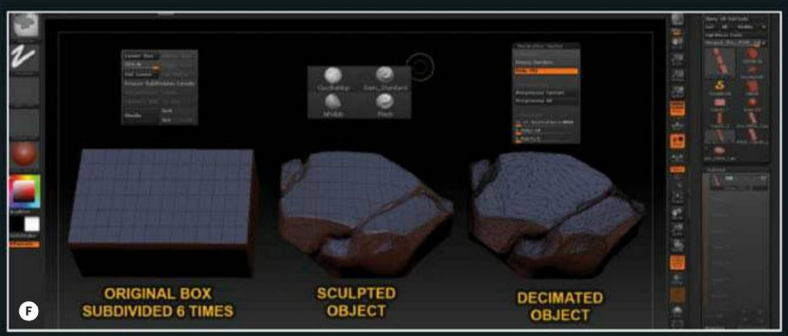
Detailed modelling

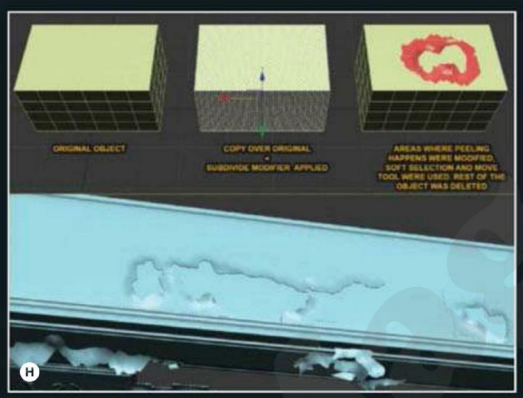
Re-create your models from the initial layout to perfect the level of detail

04 Pose the character Although my original layout didn't have a character, in the later stages I decide to add one. My intention is to sculpt a character in ZBrush, so I create a base suit model in 3ds Max, starting from a box and using standard Edit Poly tools. If you're using ZBrush, a base model can also be created simply using ZSpheres. After completing an unposed base model I use the Move, Rotate and Scale tools with Soft Selection active to position the character in the scene. I make the helmet completely in 3ds Max. It has a totally clean topology since I use a TurboSmooth modifier on top of the model to achieve smoother surfaces D.

05 Sculpt detail with ZBrush I export the base character model into an OBJ format (using the ZBrush preset). In ZBrush I merge the OBJ, subdivide it a couple of times and, using brushes like Move, Clay Buildup, Smooth and Dam Standard, I sculpt all the wrinkles and details on the suit. Once I'm done sculpting, on the first level of subdivision I use UV Unwrap in ZBrush to create simple UVs for the character. I could export back to 3ds Max on one of the lower subdivision levels of the objects and create a Displacement map. This time I choose to export the highest level to keep all the details I've sculpted, since with displacement you always lose some sculpted details E.

06 Shape rocks In ZBrush I start with a Cube3D made into a mesh by pressing Make PolyMesh3D. I subdivide it a couple of times while having Smooth turned off for the first two levels of subdivision. After that, using the hPolish, Clay Buildup, Pinch and Dam Standard brushes, I sculpt a couple of variations of stones that I use around the scene. UVs are also done in ZBrush using the UV Master tools. I use the Decimation Master plug-in for ZBrush to optimise meshes and reduce mesh complexity. Once the objects are decimated I export them as OBJ files and merge them all into a 3ds Max file where I can continue texturing F.




ORIGINAL OBJECT
COPY OVER ORIGINAL WITH SUBDIVIDE MODIFIER APPLIED
AREAS WHERE PEELING HAPPENS WERE MODIFIED WITH SOFT SELECTION AND MOVE TOOL WERE USED. REST OF THE OBJECT WAS DELETED
H

07 Set dressing Objects used for set dressing are relatively simple to model. Some of them are created by drawing a profile curve and using the Lathe modifier to revolve it around its axis, like a few bottles and a teapot. Other objects are created from a simple box and extruding and cutting the mesh to make the shapes needed. At this point I also create simple UVs using the UVW Map modifier with box mapping. These objects are later merged into the original layout scene and distributed around the image to add complexity where needed G.

08 Tear off the light box panel To peel the light box panel above the clock I've developed a simple technique. Once the panel is modelled and textured I make a duplicate of the same object and apply a Subdivision modifier with a value of 0.2. After that, I convert it back into Edit Poly object and cut areas where I want the peeling paint to appear. Then, using Soft Selection and Move/Rotate tools, I move the inner edges of the mesh so it looks like it's peeling from the original object H.

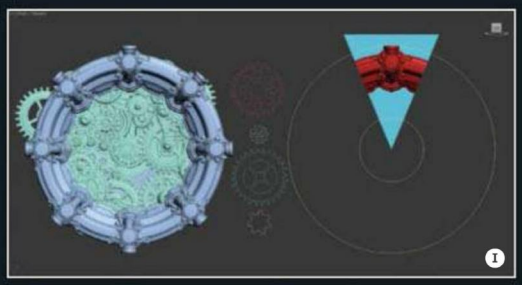
D The character is modelled and posed in 3ds Max

E Sculpt the character from the base mesh

F Rocks are made in ZBrush, including the base mesh

G Objects for set dressing created in a separate scene and later scattered around the base scene

H More details for the top light panel are added by copying the original object



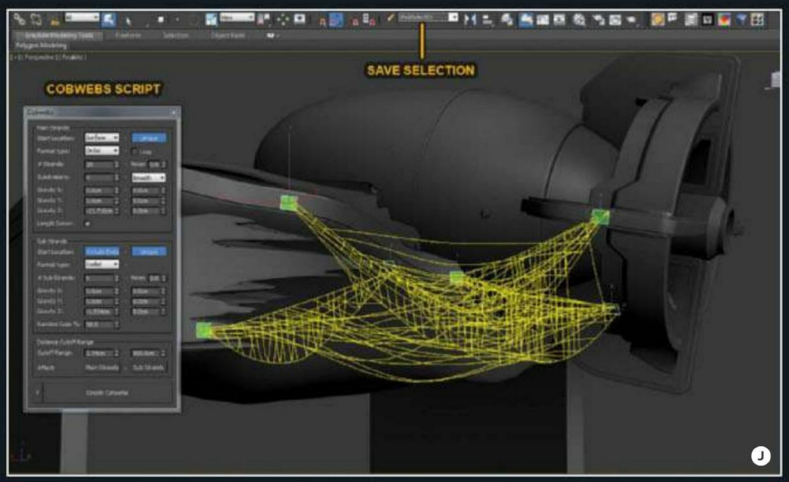
09 Model the clock Before I even start modelling the clock I already know that it will be geometry that's repeated radially, so I just have to model one part and copy it around seven times to get a complete shape. Because of this I model only one part that covers 45 degrees and later copy another seven elements around its axis point. The final frame is merged into one object and shared vertex points at the edges are welded. The frame of the clock is started as a profile curve with the Lathe modifier, plus some additional modelling. The round gears inside the clock are created using modified cylinder curves to get nice shapes and are converted into objects using the Bevel modifier I.

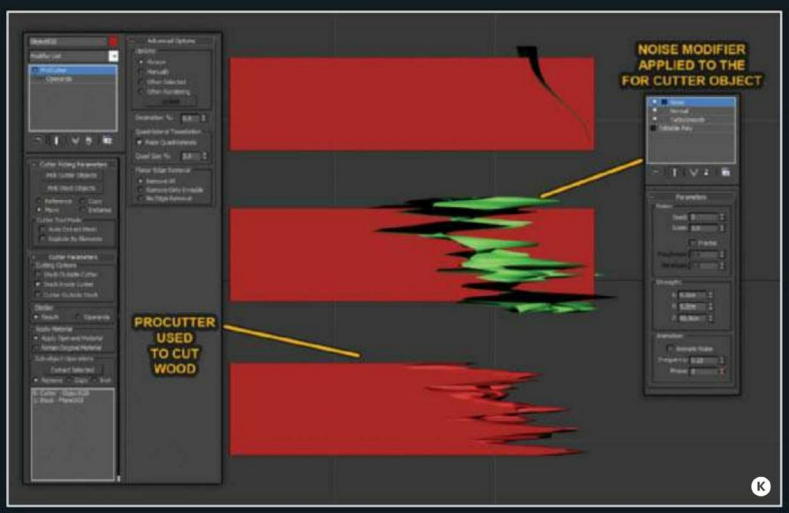
10 Create cobwebs All the cobwebs around the scene are made using free scripts from **http://jokermartini.com/2012/05/09/cobwebs**. I pick the scene area where I want to have a cobweb, create a couple of polygons that are placed on top of the surfaces where webs will connect and then select these polygons in order. I save a selection for these polygons because it takes a lot of tries to get the right result. Next I enable Radial Mesh in Editable Spline and apply small Noise and Displacement modifiers on top of everything to add some randomness to the shapes of the strands in the web. As for the options, I use Type Order for main strands, and Radial for substrands. I also set Subdivisions to 4, Number of Substrands to 6 and Random Gaps to 50% J.

11 Break up wood Areas where I want broken wood are modelled using ProCutter. I decide what parts of the objects to break and detach them from the originals. A plane is then made with a high level of subdivision, like 100 x 100. It's placed perpendicular to the wood object and, using Move with Soft Selection, is shaped to define the base form of the cut. After that I apply a Noise modifier to the cutting object (plane) and change the settings to deform only in axes perpendicular to the wood object. Using ProCutter tools on the base wood object, I pick the plane object as a Stock Object and play with settings to get a clean cut. For a better distribution of polygons I turn on Make Quadrilaterals and convert everything back into Editable Poly objects K.

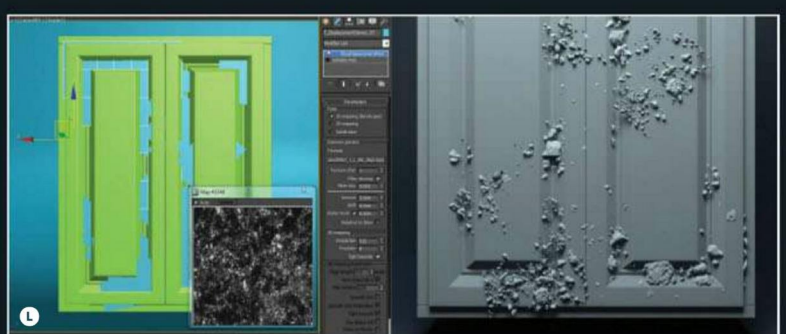
2D Displacement in V-Ray?

Although nice effects can be achieved with 3D Mapping Displacement mode in V-Ray, whenever I can I try to use the 2D Displacement feature, which is much faster and more predictable. It can also produce more detailed displacement than the other two methods, and is especially useful for surfaces that are relatively flat like a grass field or tileable ground covered with small stones. The limitation of 2D Displacement is that it can only use Displacement maps that are based on the UV space of the object, which means 3D textures like noise can't be used. In this case the 3D method is the only way to go.





12 Model with displacement While most of the objects in the scene are created using standard modelling tools, to add small stones around cabinets I use a 2D Displacement map with a water level feature. I do this by adding a Displacement modifier with a map to a simple plane object and set the water level in the Displacement map to 0.5cm. This cuts the object where the map's value is lower than 0.5, while leaving the rest of the displacement visible. This plane is then copied and placed around the scene to bring in additional details. Depending on its position in the scene, parts of that flat displaced plane are deleted to fit objects behind them L.



I Model only one section of the clock and copy it seven times to get the full shape

J The cobwebs are made using a free script from JokerMartini.com

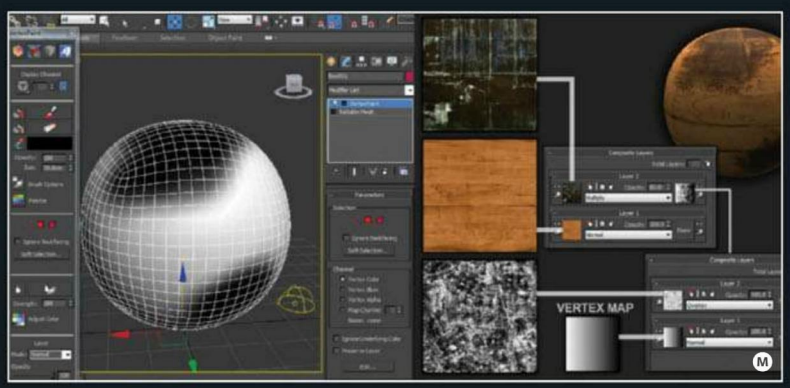
K The ProCutter compound object is used to break the wood boxes around the scene

L 2D Displacement is used to add geometry details over the scene

Texture the scene

Use procedural techniques with bitmaps to texture your environment

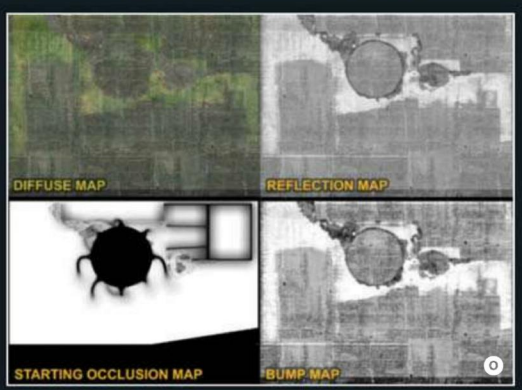
13 Wood textures For the wood I use a tileable texture in combination with a Vertex map to add dirt. Using the Vertex map modifier applied to an object, I paint with black where I want dirt to appear. Inside the material assigned to that object I add a Composite map in the Diffuse channel and use wood as a first layer. In the second layer I add a dirt texture, change the second layer to Multiply and set the Opacity to 80. As a mask for the second layer I use another Composite map. In the first channel I use a Vertex map and in the second I put a Black-and-White map, setting the channel to Overlay. This gives me all the flexibility of using a Vertex map to paint dirt directly on the objects around the scene, while still using only one material for all these objects (M).



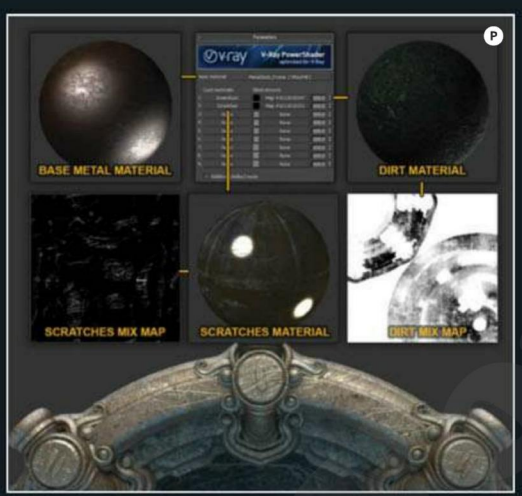
14 Texture the fridge The fridge texture is created by painting all textures – without using any procedural techniques. Using UV tools in 3ds Max I can create nice non-overlapping UVs. A screenshot of these UVs is brought into Photoshop where I paint 4,000 Diffuse, Reflection, Glossy and Bump maps. I also paint a Scratches Mask map, which is used to blend two different materials in 3ds Max with a VRayBlendMtl. The base material is the one using the textures I painted, while the coat material is a simple one, similar to aluminium, which uses the mask I painted in Photoshop. This mask is also used to create a Negative Bump map for the aluminium material (N).

The power of procedural

While painted bitmaps can be used to produce fine details on objects, it's not efficient to paint every single texture for all objects in the scene. Because of this, a lot of the time I try to use tileable textures with additional dirt layers placed in a procedural way to randomise the visual appearance. To achieve an greater level of texture complexity, I rely on these maps: Noise Texture, Falloff, V-Ray MultiSubTex, Composite and Cellular.



15 Detail the back wall When focusing on the back wall I bake an Occlusion map to figure out where the contact points are. Doing this makes it far easier to paint textures later when moving to Photoshop. To bake I create a VRayLightMtl, put a VRayDirt texture inside the Color map of that material and set a proper Radius value for the VRayDirt texture. This is then applied to the back wall and baked using the 3ds Max Render to Texture feature. In the Render To Texture menu, I select the VRayCompleteMap element and bake a 4,000 texture directly into File. I use this in Photoshop as a base where I paint Diffuse, Bump and Reflection maps. One thing to keep in mind while baking Occlusion maps is to have good non-overlapping UVs that are arranged inside UV domains (O).



16 Clock material To detail the clock object I use three key materials that are mixed together to get the most effective look. To mix these materials I use a VRayBlendMtl with a base material set to a metallic copper. The second one is set to a more diffused green material (the more oxidized areas of the metal). The third and final material is highly reflective and used to add scratches on top of the previous two materials. For Material Mix maps I bake an Occlusion map from 3ds Max and use that Occlusion map in Photoshop to refine it into a final Mix map. Based on occlusion intensity, I paint both Mix maps. Where it's more occluded I add extra dirt into the first Material Mix map so that it looks like it's more oxidised. However, in areas exposed and not occluded (white) I add more scratches for the second Material Mix map (P).

(M) The procedural approach using the Vertex Paint modifier to add dirt

(N) Fridge textures painted in Photoshop. A scratch mask is used to mix the aluminium material in the VRayBlendMtl settings

(O) Paint textures for the back wall. I bake an Occlusion map for contact points

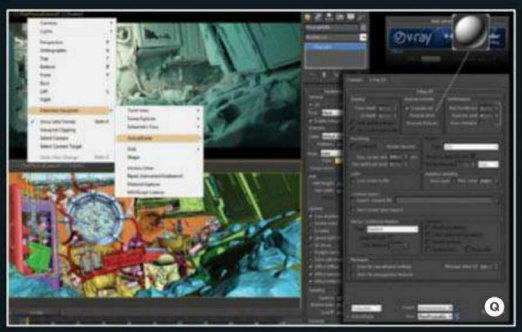
(P) The clock material is a combination of three different materials

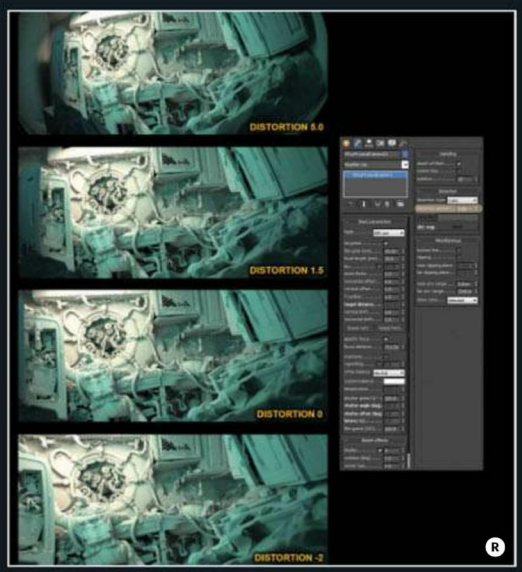
Lighting and rendering

Use V-Ray RT to light the scene quickly and efficiently

4+ hours creation time
Resolution: 5,000 pixels wide

17 Lighting with V-Ray RT Before the final stage of modelling and texturing changes, I use V-Ray RT to lock down lighting in the scene. For the Active Shade render engine I set V-Ray RT. To make everything more interactive, in the Active Shade Render menu I do a material override of the scene with a classic grey VRayMtl. I change the Viewport from Standard camera view to Active Shade. Once the scene is translated and I start to render on screen, I can tweak lighting, add new lights and modify the intensities and colours of lights. After every change, V-Ray RT refines the image, instantly showing the effects of changes Q.





18 Physical camera V-Ray's camera is used instead of the classic 3ds Max camera. I decide not to use exposure inside the VRayPhysicalCamera, which is on by default. Instead, exposure is added in the V-Ray Color Mapping menu in Render Settings. I use a Cubic method with a 0.05 value to get a nice distortion around the image borders, which gives a more dynamic composition to the scene and looks more natural. Depth of field is also used in the camera to get a nice blurred foreground. I always use DOF in the camera for still images because it gives better image quality than doing it in the post-processing phase R.

19 Rendering in V-Ray I render with the Adaptive DMC sampler with Subdivisions set to Min 1 and Max 10. An Irradiance map is used as the primary bounce for GI while Lightcache is used for secondary GI bounces. The Irradiance map is set to High and I use Ambient Occlusion set to the default value. For Lightcache I use Subdivs set to 1,500. In the Render Settings menu I set Global Subdivs Multiplier to 4 to get decent sampling for glossy reflections and DOF. All render tests are done in 2,000 resolution while the final image is rendered in 5,000 S.

Raw render or post-production?

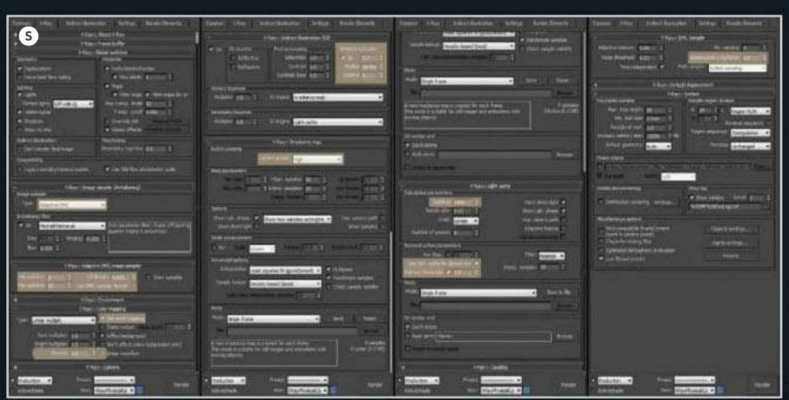
Although I prefer to make the final render as good as possible, trying to get a perfect image out of 3ds Max would consume a lot of time, since for every single modification I would have to render a new image, which takes a while. Because of that, I don't bother getting a great-looking image from 3ds Max and instead focus on doing compositing in Fusion where I can tweak colours in a matter of seconds.

Q V-Ray RT is used to make quick changes to the scene's lighting

R Testing V-Ray's camera with different distortion values. For the final image it is set to 0.05

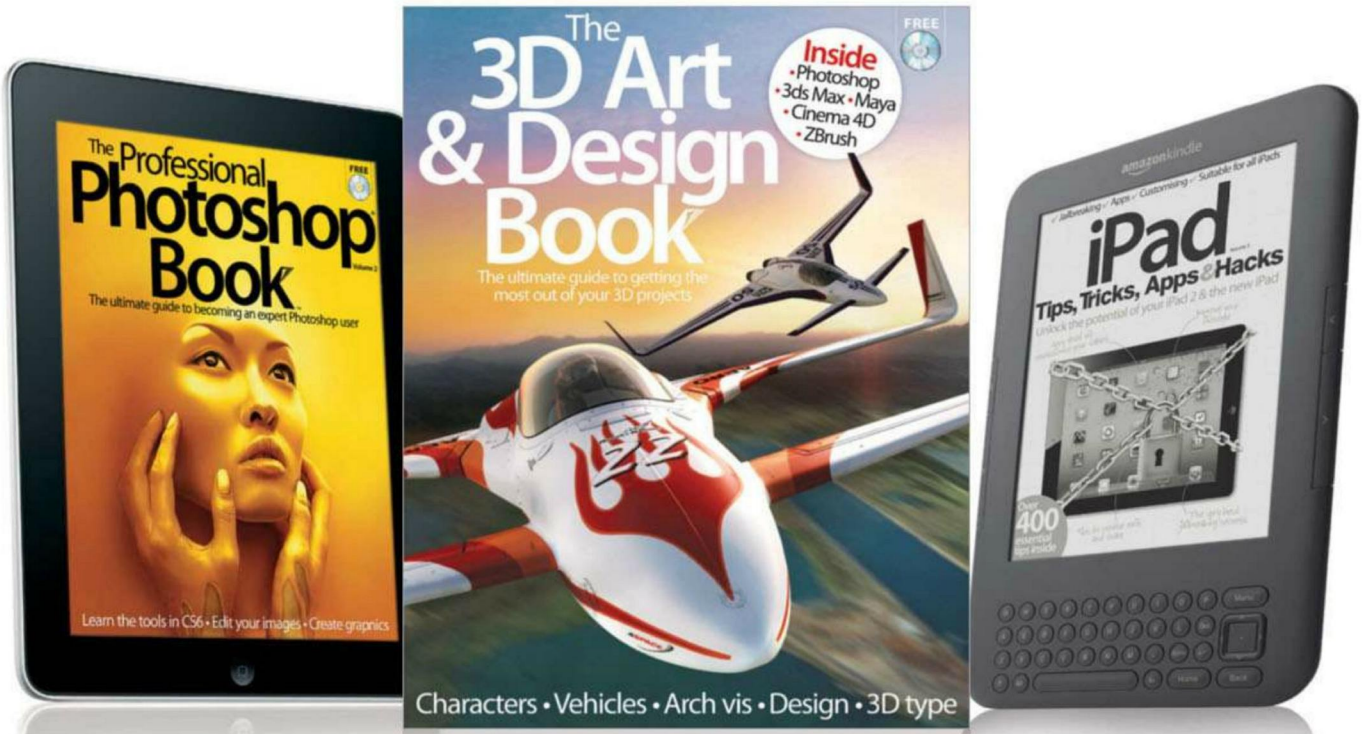
S Settings for the final render (screenshots supplied)

T Fusion is used for colour corrections on the raw OpenEXR-rendered image



20 Final compositing The final image is rendered in OpenEXR format so that I don't lose any information from the colour values, like TGA or PNG formats do. This is then taken into Fusion where I apply several colour corrections to get the values I want. I also use masks in combination with colour corrections to darken parts of the image in the foreground while areas around the clock and the character are corrected to be more visible and to attract attention from the viewer. While doing post work I tend to flip the image often to get a fresh perspective. The final image is actually a flipped version of the original T.

Learn in style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The ultimate guide to becoming an expert Photoshop user
Learn the tools in CS6 • Edit your images • Create graphics
The 3D Art & Design Book
FREE
Inside
• Photoshop
• 3ds Max • Maya
• Cinema 4D
• ZBrush
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I made this...

Incredible 3D artists take us behind their artwork

Artist info

Angel Alonso

Website www.angelitoon.deviantart.com
Country Spain
Software used Organica, 3ds Max, ZBrush, Photoshop
Bio Angel has dedicated 25 years to 2D and 3D animation

Software used in this piece

Organica | 3ds Max | ZBrush | Photoshop

Andromeda Exiles 2012

I grew up near a seaport where cranes and iron scrap were part of the landscape. This has had a great influence on my industrial landscapes, in which iron and mechanics now play an important role. With my spaceship designs, I try not to limit myself to traditional forms taken from planes; I prefer to experiment with the shapes of ships and buildings, mixing advanced technology with old and rusty objects.

> I wanted to include some [kind of] natural element in the image – something that would contrast with the cold iron of the buildings and the ships. As such I added a sea to the image, to position the image within a landscape

"Smoke is always present in my futuristic images. I think it gives them a certain life and atmosphere, while also creating the sense of a near-future dystopia in the vein of Orwell. I created this smoke using Fume FX"

"I use an old program called Organica to do my sketching in 3D and create the basic shapes, then with ZBrush I add details to the buildings, all the while inspired by things that I remember – like an oil refinery and even the top of an aircraft carrier"

Superior interiors

Vintage bedroom 2012

Take your arch-vis skills to the next level, using 3D and 2D techniques to create a dramatic bedroom interior

Eugenio Garcia Villarreal is a 3D generalist who focuses on environments and product shots. He's also the co-founder of D10Studio

behind the scenes

3D artists explain the techniques behind their amazing artwork

Artist info

Eugenio Garcia Villarreal

3DArtist online

Username: artecnl

Personal portfolio site www.flickr.com/photos/artecnl

Country Mexico

Software used LightWave 11, Photoshop, ZBrush

Expertise Eugenio is a 3D artist specialising in environments, texturing and product shots. He uses a combination of 3D and 2D techniques in his work

Learn how to

- Create a 3D sketch
- Model the basics
- Prepare textures
- Use the Offset tool to effectively tile textures
- Create a basic cloth simulation
- Use Displacement maps
- Quickly sculpt simple objects in ZBrush
- Tackle linear lighting
- Composite and retouch the final image

Concept

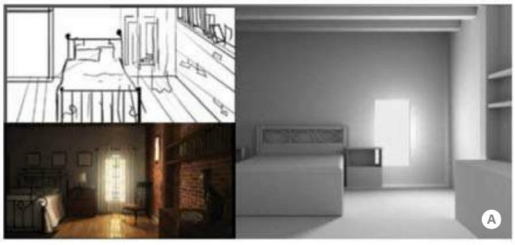
This scene is inspired by vintage-style bedrooms that heavily feature antique materials such as worn wood, exposed brick walls and aged paintwork. The idea behind this project is to capture an image with a dramatic mood through careful texturing, effective cloth simulation and atmospheric lighting to create a warm, lived-in environment.

This tutorial will show you how to create an interior bedroom scene, focusing on texturing, cloth simulation and lighting. You'll learn techniques I have developed throughout my career as a 3D artist, including basic modelling using essential LightWave Modeler tools, and the best way to find good textures with complementary maps, such as Bump and Displacement.

We'll also focus on lighting and how to make warm scenes with contrast to achieve a dramatic mood. We'll also tackle the compositing process, exploring some of my favourite techniques to fine-tune details, using colour correction, masks, textures as well as simple matte-painting techniques. I'd like to thank Alejandro Tello, a talented artist at D10Studio who helped me with the final colour correction.

Research and sketch

Explore the perfect shot for your scene



01 Start with a sketch

I use basic 3D shapes to create a quick 3D sketch. This will help me with the final compositing later on, as I can touch up this 3D base in Photoshop to add objects and atmosphere. Along with an initial sketch, this will give us a solid base for the project A.

With the Disc

- Bed and lamp OBJ models plus MTL files
- Tutorial screenshots
- LightWave shortcuts PDF

Also with the disc:

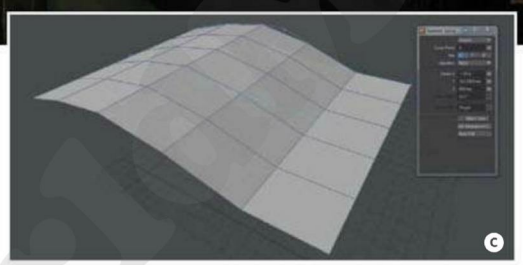
- High-quality 3D book models courtesy of CGAxis.com

Software used in this piece

LightWave ZBrush Photoshop

Be practical

When I model objects for a still image I try to add details – but not too many, as I can do this later on in Photoshop. An example is the curtains: I completed a simple spline drawing, extruded in Y, subdivided it – and that was basically it. I'll can use the Liquify tool in Photoshop to create the organic cloth folds. With time-saving tricks like these you can be practical and finish the job in a fraction of the time, with all the same results of 3D, with respective limits.



A Create a basic sketch to find the right composition

B Models are kept very simple, as shaders and textures will improve them later

C The Spline Guide helps you to bend, twist and change scales

02 Time to model In my workflow I tend to use basic box modelling, cylinders and primitives. For bed clothes I use subdivided box planes. For the bed and window decoration I work with Spline Guides using the Rail Extrude tool. It's also a great idea to reuse old models when you can, such as the petrol lamp and the radio in this scene. For the chair I follow a simple spline and box-modelling workflow B.

03 Move to LightWave Modeler I always use the Spline Guide in the Modify tab, as it's great for bending objects, stretching and twisting. Rail Extrude, in conjunction with the Spline Guide, is also a great time-saving tool. I use the Bandsaw tool to subdivide along with the Knife and Bend tools. Using shortcuts is a big help – learn them if you want to save time. You'll find a PDF of my top shortcuts supplied with this tutorial C.

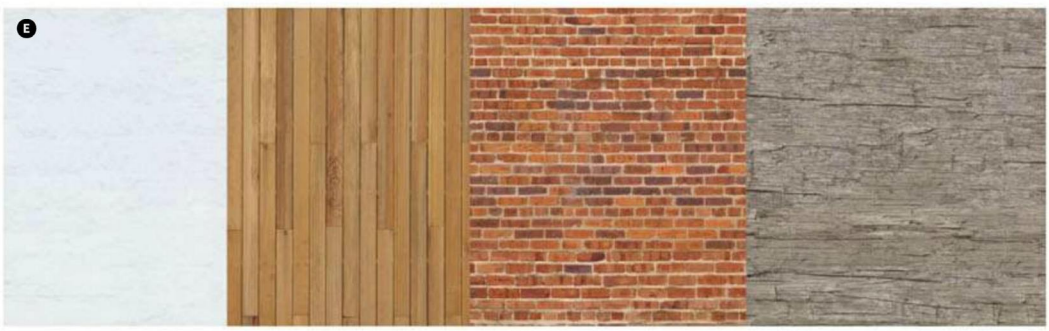
Get stuck into modelling

Find your own working method with LightWave's Modeler tools

04 Use the Rail Extrude tool I model the bed using splines. This is a great trick in LightWave, as you simply draw the pattern and use the Rail Extrude tool to extrude a cylinder. Remember to use only the front face of the cylinder. I put the spline in a background layer and the face at the beginning of the spline, then simply click on the bent tubes. I repeat this for all the patterns of the bed frame D.

05 Research your textures I always recommend using texture sites – most of them have a free quota of textures. Personally, I have a membership with CGTextures.com, which gives me a quota of 100MB of textures a day. This is more than enough for a single 3D artist so I suggest you give it a look. For this scene, I choose a basic brick texture, a couple of wood maps, white plaster and some cloth textures. These are only small textures, as we'll make the magic happen later when we get into Photoshop E.

06 Tile your textures When you find a nice texture, you may discover that it won't make useful tiles to cover the area you want to texture. A good way to get around this is to use the Offset tool in Photoshop, which you'll find in the Filters tab. Simply make a vertical and horizontal offset to create a good centre for the seams of the texture. You should find that by using the Clone Stamp tool you can get rid of the excess seams. Move the Offset tool again and try to use a round brush with your Clone Stamp tool for really precise results F.



D The Rail Extrude is an incredible time-saving tool

E CGTextures.com helped me with the texture hunt for this particular scene

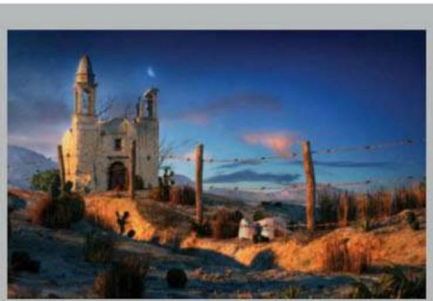
F Photoshop's Offset tool is the key to success for tiled textures

Artist Showcase

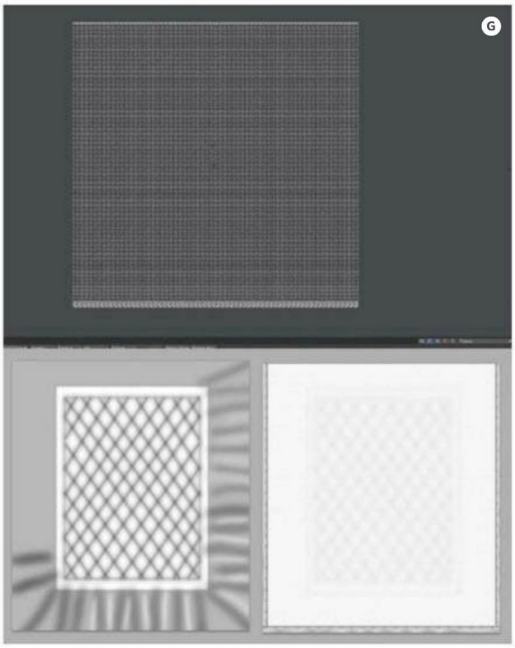
Eugenio Garcia Villarreal

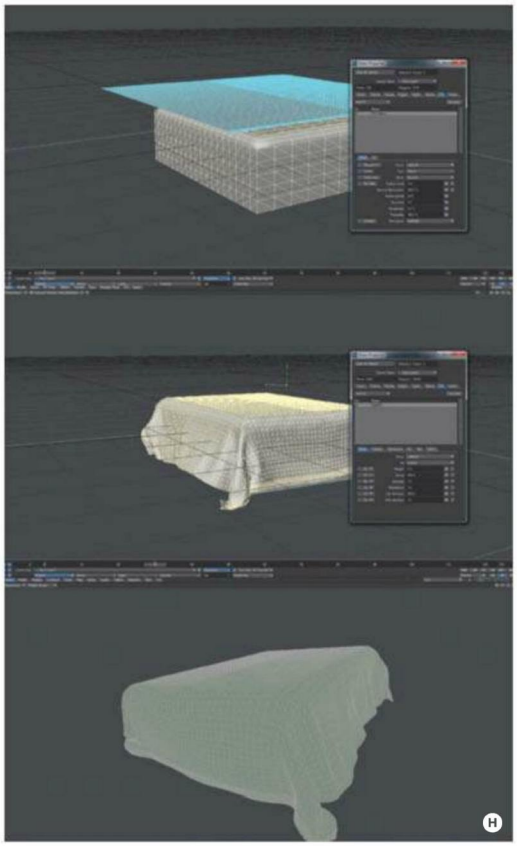
Eugenio is an artist living and working in Mexico who taught himself 3D techniques by reading tutorials and watching video guides. He's now the co-founder of D10Studio, a digital agency in Mexico, and he boasts a degree in Graphic Design. He loves art, illustration and cars.

Detective's Office **LightWave, Photoshop (2011)**
This was created for issue 28 of 3D Artist magazine. The scene is based on a stereotypical old detective's office. It involved a lot of 3D modelling and post work



Real de Catorce **LightWave, Photoshop (2008)**
Created after Eugenio's travels to Real de Catorce, a town in Mexico, he wanted to capture the incredible mood of the desert sunsets he saw there





Play with contrast

For a long time contrast has been used to make images more interesting, as it helps the eye to explore the complete image. Plain light is your enemy! The use of good contrast is eye-candy, as it can be applied to light, dark and colour temperature, as well as the concentration of mass objects too. With this scene I use contrast to create depth and a warm environment. You can experiment with this in 3D using linear grading lights. Textures will help with this a lot too.

Ⓖ UV texture sheets make the texturing job very easy

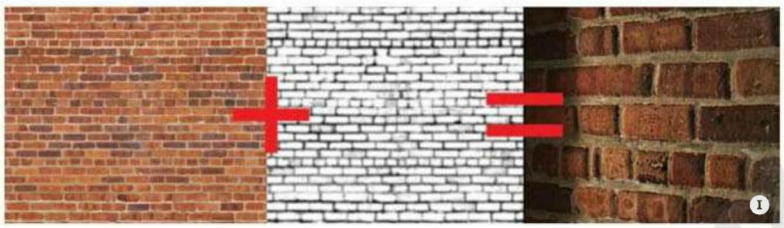
Ⓗ You'll need a lot of patience with ClothFX, but in the end you'll have great results

Ⓘ I bring in all the depth information with Photoshop, desaturating and playing with the levels

Ⓙ Experiment with different focal lengths to get the right look

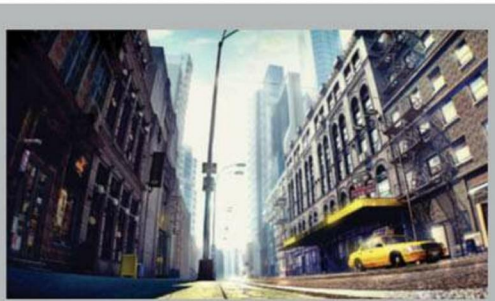
07 UV texture sheets This is an easy task. Before running the cloth simulation, we need to UV-map the bed sheets. I basically create a box with lots of subdivisions, then use the basic planar texture UV-mapping. I export the EPS file too, so I can work on it later in Photoshop. This will facilitate you when you run the simulations and export a transformed object. The sheets will look great with folds and a decent texture Ⓖ.

08 Basic cloth simulation LightWave's ClothFX can often cause several headaches – but don't worry, you just need to find that sweet spot with all the variables. It's like polishing a rough model. All I do is use the ClothFX tool with a rectangle that's the shape of a mattress to run the simulations on. I make around 40 simulations until I find a nice one – simply select the object and save the frame you like as a transformed object, and you're done. You now have your blank sheets. The best part of all is that they're UV-mapped and ready for the textures and Displacement maps Ⓗ.

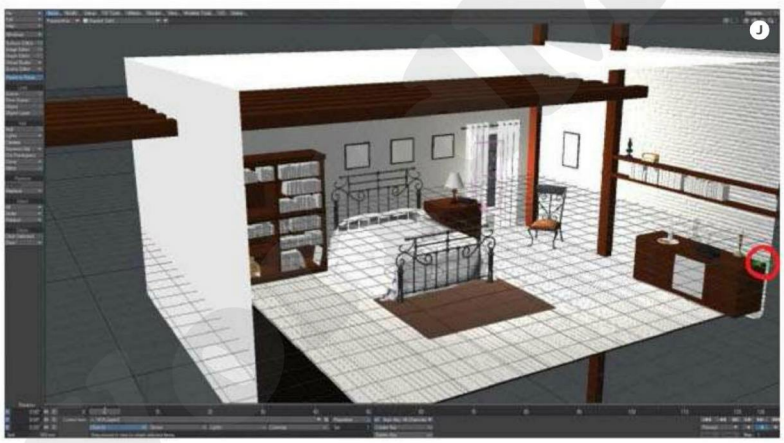


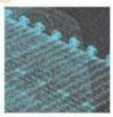
09 Use Displacement maps I create a black-and-white conversion in the brick texture map, then add a Gaussian blur. This will make a good Displacement map combined with the detailed sharpen texture. This is in the Deform options in the Properties tab on the wall object. Apply a sub-patch to the wall in Modeler, then in Layout you can increase the subdivision level. I add 60 to the Sub-level to get nice details in the map. Clone the wall plane four times to get the full effect. To avoid freezing frames you can add the subdivision level increase in the render, not in the GPU display Ⓘ.

10 Composition and camera setup Since I already have my sketch, I just move the focal length of the camera to 35mm. I want to make the chair and window my main objects, so I move them to get a nice distribution. Good contrast in light/temperature and distribution is needed. The brightest parts of the image are less crowded and the dark areas have lots of objects Ⓙ.



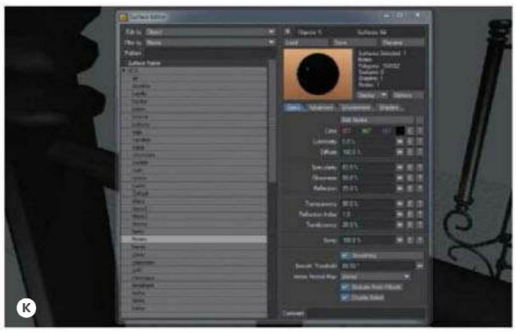
***NY Street* LightWave, Photoshop (2011)**
An image created for an old project, inspired by the streets of New York. This one was completed after around four days of modelling. The cab is the only model not created by Eugenio





Let there be light

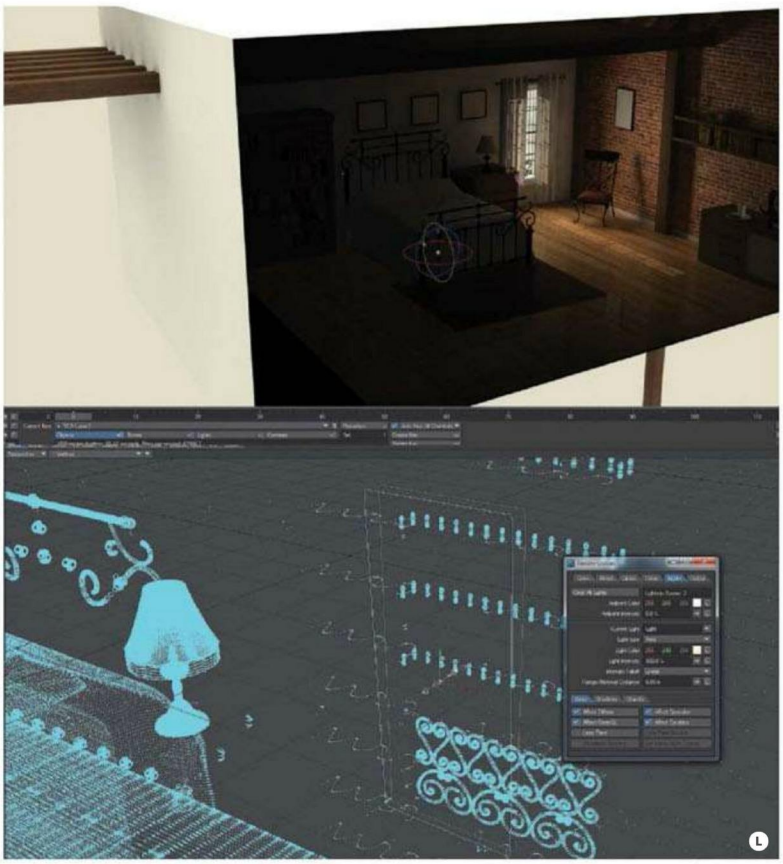
Let's render, colour correct and finish up our scene



11 Set up the scene's lighting As mentioned, contrast is the key to a good image. I use basic area lights in this scene, putting one in the window position and enlarging it to get the same size. I also add a Linear Mode to the light with 300% Intensity and enlarge the gradient. VPR is a good way to see the increase of the light in real-time. You'll find FPrime is also a handy real-time tool K.

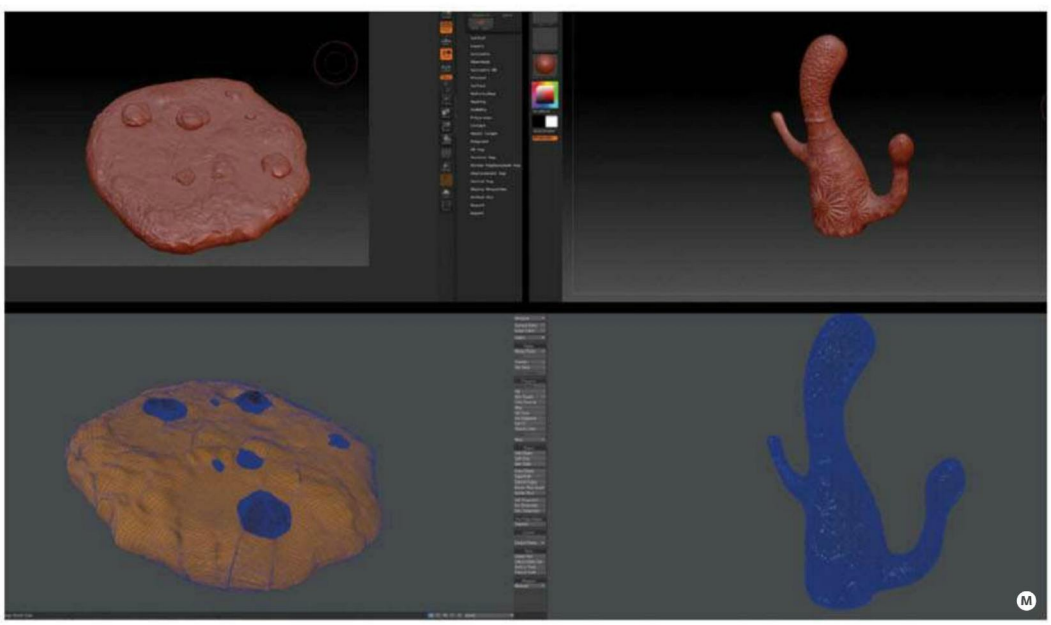
12 Add textures and shaders I use the main textures combined with shaders mostly preset in LightWave. For the bed I use a simple black shader with Reflections at 15%. The floor is reflective too, so 15% gives a good-looking glossy finish. The wood on the columns and furniture has a Bump map at 200% to get a nice, rough texture. The bed has Bump and Color maps too and all the books are sourced images of simple boxes. You can later touch up the complete scene to get more texture details L.

13 Sculpt in ZBrush I create two objects in ZBrush: the glass sculpture and the cookies. I export an OBJ base mesh from LightWave Modeler and import it into ZBrush, subdividing the geometry and using standard brushes to sculpt. For the cookie object I use a crumpled Alpha with the Standard brush, combined with the Move tool. For the sculpture, I use the Drag brush to apply patterned shapes. I later export all to LightWave, with a high polygon count M.



K Linear light helps to create nice contrast in the scene

L Surfaces with no texture can be given 3D shaders



M ZBrush is a great program – it can help a lot with organic and sculptural objects

Keep it natural

In 3D we usually prefer to be as clean and perfect as possible, but we also need to see the nature of objects. It's the little imperfections that make an object real, such as burnt marks in a wooden plank, aged effects on walls, rounded, cool, worn objects and so on. Just try to imagine the story of every object and what may have affected it over time. Take the floor for instance: think about how many people pass over it, where they put their feet and work out where the worn textures should go. This will make your work even more believable.

Render and post work

Give your image a final boost in these final stages

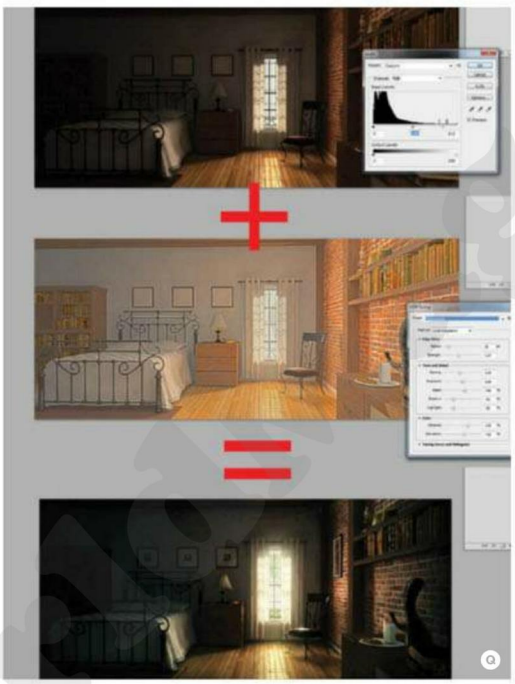
15 hours creation time
Resolution: 7,534 x 3,304 pixels

14 Colour correction Opening the render in Photoshop, I adjust the levels and experiment with the values. I find the raw render a little plain, so I focus on getting more contrast and take out some of the reddish tone. Next I use HDR Toning on the image, make a photorealistic pass and put that layer over the colour-corrected one. I change the opacity and set it to Overlay mode. To finish this stage, I mask the HDR-converted image and use a Round brush to bring out the light details, such as reflections and areas of contrast N.

15 Matte-painting techniques We'll bring some extra details into the scene, such as the red fabric on the top of the shelf, crumbs from the cookies and so on. A cracked texture on the white wall is also added in Overlay mode in Photoshop. Plants outside are textures that are overexposed to match the light O.

16 Final details Little details are added now, using the Dodge and Burn tools to make more contrast. I use the Burn tool behind the beams and at the edges of the image. I'm trying to mimic the effect of being in a dark room and suddenly entering one with a strong source of light. When this happens you only can see limited aspects of the dark spaces. Some glows are also added with a large round brush. I add this on a top layer, so I can easily transform its scale P.

17 Colour correction and HDR filtering As in the previous stage, I make another pass of photorealistic HDR toning now. Using masks to bring more details in, I put some yellowish colour in the light source and finally sign the image. This project has been a great exercise in exploring light and texture. I hope you'll be able to apply these skills to your own projects Q.



Render setup

For the final render I use LightWave's rendering engine with Adaptive Sampling set to a level range of 12-12 with Classic Reconstruction filter and a low-discrepancy Sampling Pattern. The radiosity is Monte Carlo with three bounces in the final render. The final resolution of the image is 7,534 x 3,304 pixels, rendered using F9 and saved as 32-bit TGA files.

N Try to get some nice contrast at this stage – it will be the base of all the final details

O You could add details infinitely, so you need to focus on the primary ones for time's sake

P Use your Transform tool to increase the size of the glow, setting a warm tone

Q HDR Toning is a great tool if you know how to combine it with your base image

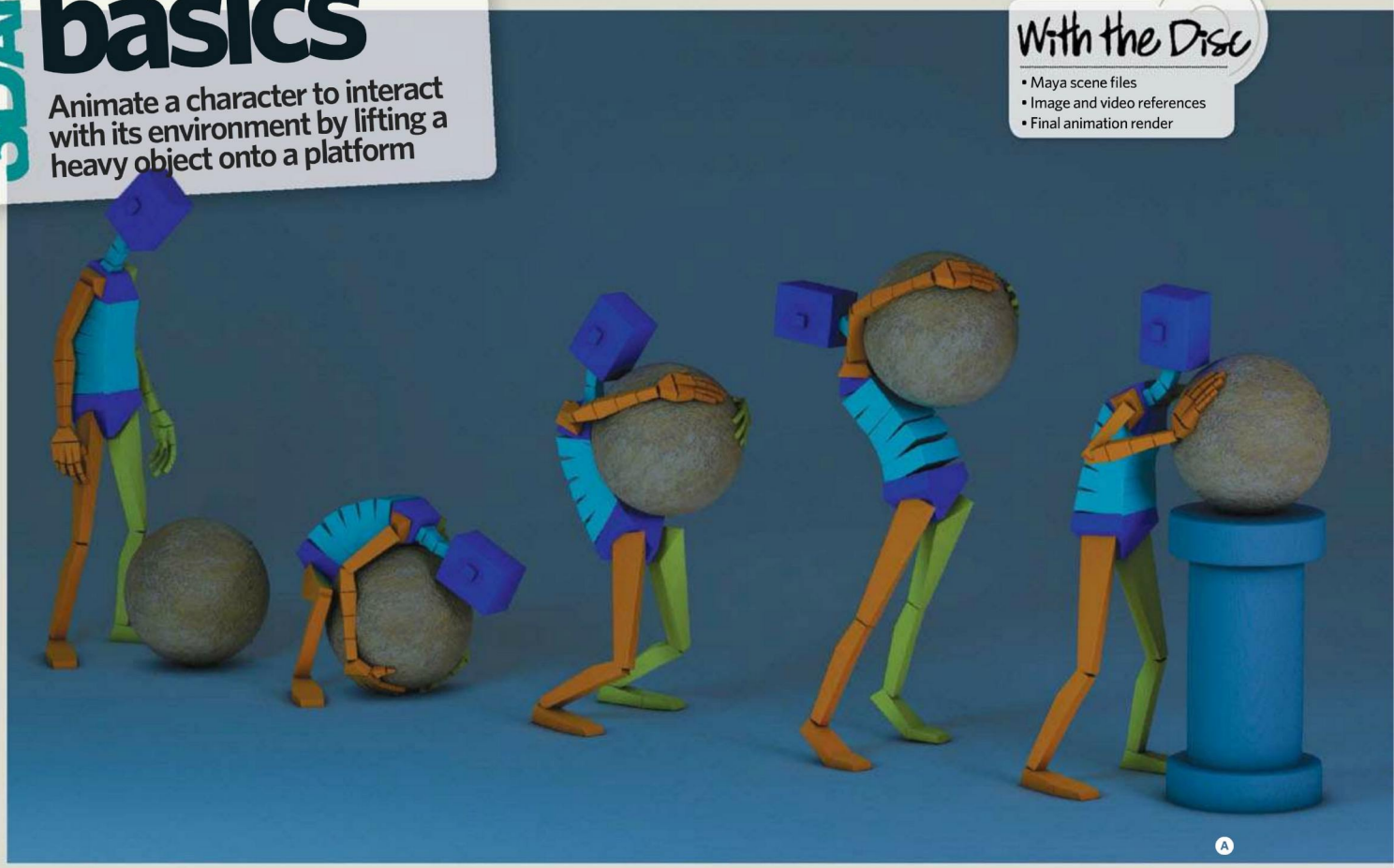
3DArtist

Back to basics

Animate a character to interact with its environment by lifting a heavy object onto a platform

With the Disc

- Maya scene files
- Image and video references
- Final animation render



Animate a character lifting weights

Jahirul Amin helps us add realism to animations in Maya, although any software can be used

In this issue's tutorial, we're going to be looking at how to create a believable interplay between a character and a heavy object, to convey a sense of weight. Our character is going to lift a heavy ball from the floor and place it on a plinth. Not an everyday activity, I grant you, but if you want any character to interact with its environment – open a door, make a cup of tea, then sit down and read a copy of 3D Artist – you're going to have to be able to master the fine art of animating weight. Here we'll be using Maya, but obviously the same techniques can easily be transferred to a 3D package of your choice, so don't feel you're confined to just one program.

First we'll consider the physics behind what we're trying to achieve. We'll look at the centre of gravity of an object and a character and see how the latter shifts during their interplay. We'll also revisit Newton's Third Law of Motion, which states that every action has an equal and opposite reaction. We'll then – as ever – move to the essential step of gathering and analysing good references. After that it'll be time to block out the key poses.

Sorry to disappoint, but we won't be seeing too much of the Graph Editor this issue as by the end of the animation we'll have keyed in poses every 2-4 frames in order to help transitions from pose to pose and to add subtle detail. This is something that the computer cannot possibly achieve by itself. This is simply the way the exercise is approached here, however. It's by no means the only way to skin this particular cat, so please find your own preferred way and try different methods.

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The centre of gravity, as you'll all remember from school, is the average position of weight distribution in an object or character. In this exercise the ball's centre of gravity will be its geometric centre, while the centre of gravity for our friend Box Boy – at the beginning of the animation when he's standing upright – will be around the height of his box belly button. However, as Box Boy lifts the ball, the centre of gravity shifts but has to remain over his base of support, otherwise in reality he'd fall flat on his box bottom. So, to get a successful animation that conveys the lifting of a heavy weight, we will have to demonstrate an understanding of how the centre of gravity travels. This ground work will ensure that we can achieve the most realistic results possible.

We also need to keep Newton's Third Law of Motion in mind. If every action has an equal and opposite reaction, then in order to move a heavy object, the force exerted on the object must be greater than the force exerted *by* that object. The ball in our example is very heavy, therefore the effort exerted by Box Boy must be seen to be very great in order to convey that sense of weight.

Now to the all-important gathering and analysis of reference. Once you find solid reference, watch it over and over again to get a good feel for the motion of the body and the mechanics of lifting a heavy weight. Analyse the arcs in the back and the wave-like motion that runs from the hips and up the spine as the weight moves upwards. Observe how the weight is taken not just by the arms, but by the whole body. Note which parts lead or follow.

Observing power-lifters is extremely useful, as those guys really know what they're doing when it comes to lifting. Rob Orlando from Hybrid Athletics (www.hybridathletics.net) has kindly allowed us to reproduce his material. It provides invaluable reference and you'll find it accompanying this tutorial for your benefit. See the subtleties involved in this great exertion: watch the hands shift around the ball in search of a strong grip and observe the feet shuffling to attain better balance. These small details add such texture to the final look. However, always bear in mind reference is a guide rather than a template, as the proportions of the character are going to be different.

For this exercise, as in previous tutorials, reference footage was taken into Kinovea and drawn over (please refer to the supplied files). The yellow drawings indicate the key poses that we'll want to make clear throughout the animation and will be part of the first pass when blocking out the shot using the pose-to-pose method. The red drawings show the breakdown and in-between poses that will then come with the second and third passes with the curves set to Spline.

As we get into the animation process, consider the crucial roles of spacing and timing when creating the illusion of weight. In lifting a ping-pong ball, spacing would be large and timing fast, as the effort is negligible. In this exercise, to create a sense of weight, the precise reverse will be true. Spacing will be tight and timing slow. Keep weight consistent as the ball travels upwards or the illusion will be broken.

Carefully consider how you're going to approach the animation before you begin. Will you constrain the ball to the hands or vice versa? We need to determine what is leading and what is following. In reality the ball will be following the hands but technically it would be easier to constrain the hands to the ball. As we want the freedom to have the hands to be on and off the ball – and don't want to be faced with the hassle of setting keys on the extra attributes for the constraints – we'll simply parent two locators to either side of the ball and point-snap the IK hand controls.

Break up the motion as you animate, as the body doesn't move as one lump mass. Have the spacing different on the hands, for example, so one hand leads quicker than the other. Vary the tempo and delay some movement, as this will reduce any twinning of the poses where the left and right look mirrors. Remember to use your references as a guide only and push the poses further if you wish to achieve a cartoon-y effect. Constantly ask yourself if your pose is clear.

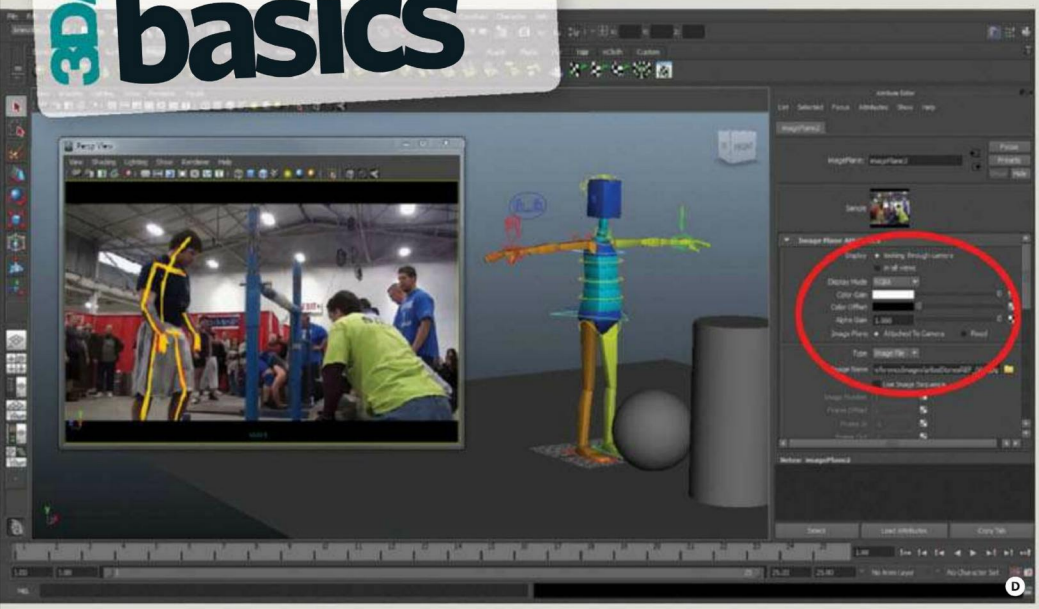
So we're ready to start, once the admin is out of the way. We'll be working in PAL (25fps) and as we're beginning pose-to-pose we'll set the Default Out tangents to Stepped. Also, we're going to be putting all four limbs in IK mode because it'll enable us to edit the position of the hips and spine without affecting the hands.

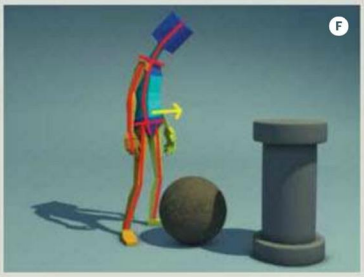
A Final render of the key poses

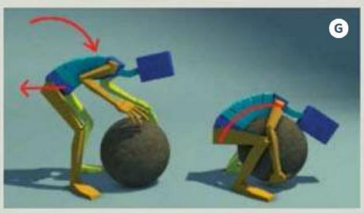
B Analysing and drawing over the reference image

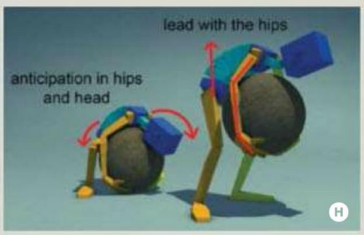
C The control rig used throughout this tutorial, which you are free to experiment with

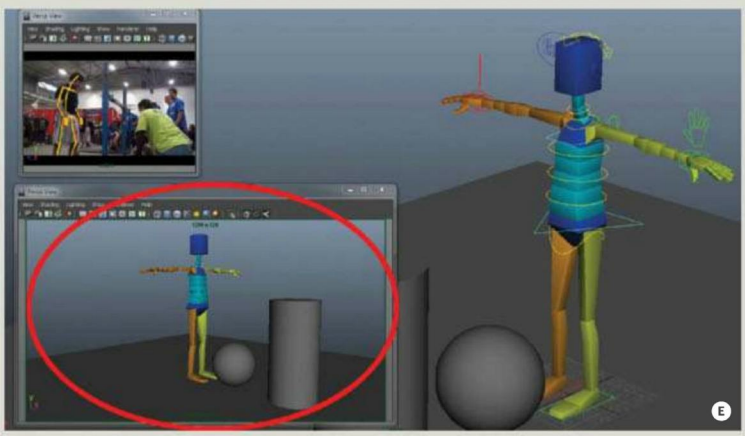
3DArtist Back to basics











D Take your references into Maya to view

E Animating to camera enables you to 'cheat'

F Loosen up the character and make it seem more relaxed

G Consider the centre of gravity of the character

H Think about which part is leading or following moves

Expect the unexpected: using anticipation

Anticipation lets the audience know that something is about to happen. Before a pitcher releases the ball, he pulls his arm back. A car rolls backwards ever so slightly before it pulls away. In essence, anticipation ensures that your point won't be lost as the audience will be ready.

Time to get heavy...

01 Take in the reference

Open up '00_start.ma' to find the Box Boy rig, a sphere, a pillar and a ground plane. Put the pillar and ground plane on a layer called 'environment' so we can show and hide them if needed. Go to Panels>Orthographic>New>Side to create a new camera and call it 'referenceCam'. With the camera active, go to View>Image Plane>Import Image and select 'atlasStonesREF_000.jpg' from the referenceImages folder. Under Image Plane Attributes, edit the Display to Looking Through Camera and also check Attached to Camera. Now translate the reference camera away from the main scene and have the view as a floating window by going to Panels>Tear Off D.

02 Set up the camera

Go to Create>Camera>Camera and rename that new camera 'renderCam'. Position it and when you are happy with the view, lock all the Translate and Rotate attributes. This will be the view that we will mainly work with to check our animation and also do all our playblasts from. Although we recommend checking the poses from every angle, working with a camera will also enable us to cheat some things to get stronger silhouettes if needed. For example, the arm further away from the viewer is slightly distorted, which was a deliberate move to get a better silhouette. Now go to View>Camera Settings and turn on Resolution Gate. This will help you frame your animation as well as make it clearer what is in and out of the shot E.

03 Weigh it up

Begin by loosening up the main character and breaking away from the default T-pose. Add some weight to the initial stance by moving his weight to one side, relaxing the fingers and adding some curvature to the spine. This is the first pose the audience will see so let's make sure it has some interest. Start adding in the first set of key poses, using the reference as a guide to help with the timing. Analyse how one hand moves faster than the other and observe the slight roll of the ball towards the character as he begins to weigh up the challenge F.

04 Move down

As he moves down to get closer to the ball, think about where his centre of gravity is. Move his hips out to help his balance and stop him from toppling over. Once you have him at his lowest point, really wrap his body around the ball and get the strongest C shape through the spine that you can. Spread his knees to really bring the ball closer to his hips and get both holds firmly below the ball. Remember the principles of the bouncing ball exercise and consider this to be the squashed pose that will nicely contrast the big stretched pose coming up G.

05 Move up... slightly

Before you make Box Boy lift the weight up, slightly lower him, then begin the up movement, leading with the hips, working down the spine and running down the arms. Keep the ball close to his chest but also straighten the arms to help sell the weight of the ball and

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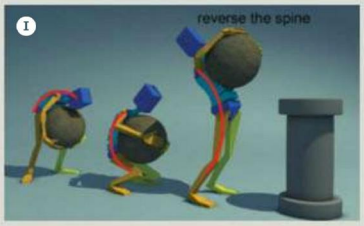
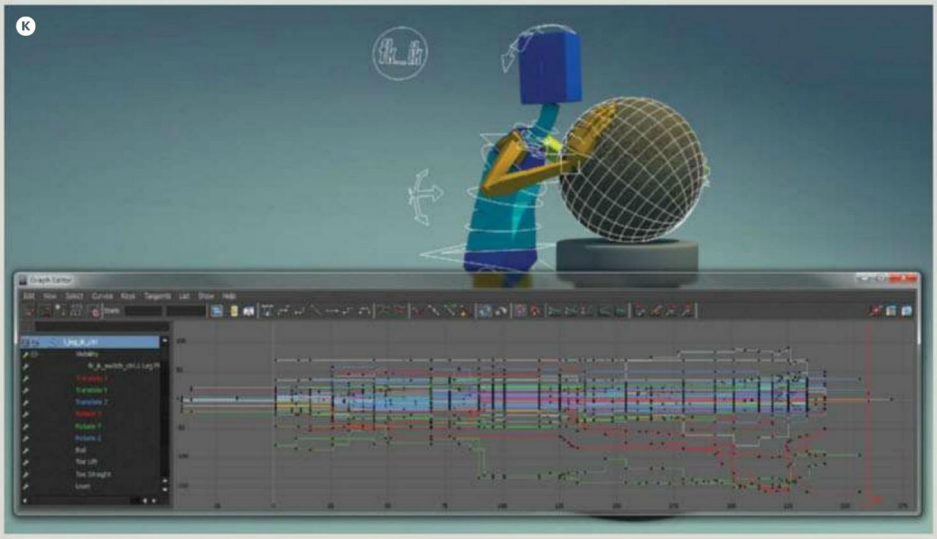




the effort needed to move it. We're translating both IK hand controls and the ball together, while setting keys so as not to cause any floatiness between them. Having him rest the ball on his knees will also help to reinforce the idea that this is a heavy ball. Try to bend the legs as much as possible to again contrast the straight legs of the approaching stretched pose H.

06 The push off

So, with the ball resting on his legs, we should now be ready for the final push. You could also reorganise his feet slightly to show the audience that he has to redistribute his weight to manage this large mass on his legs. Once his hands are firmly placed, again lower the body slightly and really get his hips under the ball before moving up to anticipate this big move ahead. Add contrast by switching from the C-shaped spine to a U-shaped spine and begin to use the legs to help lift the ball by straightening them out I.

07 Wave motion

With the hips leading and pushing the ball up, we now want to create a wave-like motion running up the spine that rolls the ball up as opposed to purely lifting with the arms. Really arch the spine backwards and straighten the legs, slightly lifting them onto the balls of the feet. We're really using the entire body now to get this ball up, so we can bring it down onto the pillar. This should be the pose where the body is at its most stretched. We're using this broad shape, while before we used the small squashed pose to really add contrast and texture to the animation. Also, think about the line of action. Is the pose clear, strong and well-defined? J

08 Add the breakdown poses

At this stage, the timing should be firmly set and the animation reading well. If not, I recommend you re-jig the poses until you are happy, as it will be more difficult to make broad changes later. Next, open up your Animation Preferences and change the Default Out tangent to either Spline or Auto. Select all the controls, open up the Graph Editor and convert the Stepped curves to Spline or Auto. Now go through the entire animation again, adding in the breakdown poses. Here you can add further anticipation to the poses if needed and also start delaying parts of the body K.

09 Check your arcs

When checking the arcs, start at the hips and work your way out, as most of the motion for the entire character will feed off from there. Bear in mind that any changes we make to the hips will generally have a knock-on effect to the rest of the body. As we are using Inverse Kinematics for both the arms and the legs, it will be important to check our arcs, as IK will have a linear interpolation from one pose to the next. Also, check the arcs created by the ball itself and make sure the path of action is clean. To do this, select a control and go to Animate>Create Editable Motion Trail L.

10 Clean up

To keep the hands firmly on the ball, create two locators and hold down V on the keyboard, point snapping them to the hand controls wherever they need to hold the ball firmly. Parent these locators under the ball geometry so they follow the ball correctly and then point snap the hand controls to these locators. This helps reduce the odd sliding that can occur. When dealing with the hands, try to keep them fairly close to the ball – almost penetrating if need be. Sometimes it's better to penetrate the ball rather than have the hand slightly floating off it. Last, add some rotation to the ball so it feels as if it is being rolled up the chest with more conviction. Happy animating! M

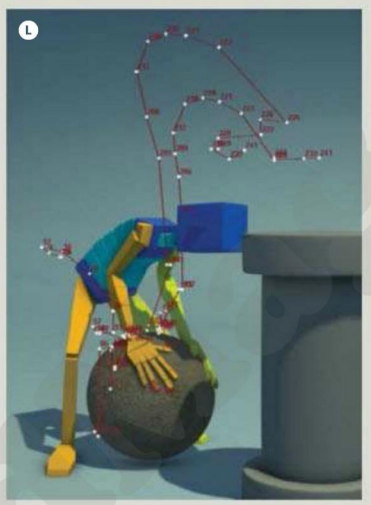
I Alternate the arc of the spine to add contrast

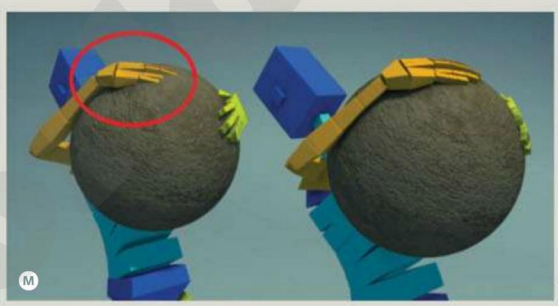
J Capture the wave-like motion of the body during the lift

K Convert the interpolation of your curves from Stepped to Spline as you add poses in between

L Use the tools to check your arcs

M Check if the hand intersects the ball





Squash and stretch

As I animate, I'm constantly thinking of when to add squash and stretch, as wise use of these two concepts adds a great deal of interest to a piece by varying its form. In this exercise the squash is when the character bends to pick up the ball. The stretch is when the ball is at its highest point. In both these examples, the character isn't physically squashed or elongated as it's not a cartoon feel I'm after. Both poses form a nice contrast to the default standing pose by taking the body to its limits.

3DArtist

Masterclass

3D freelance artist Filippo Veniero creates all his work with open-source software. This issue he reveals some of his secrets in version 2.64 of Blender...

With the Disc

- porsche_911_3DArtist.blend
- textures.zip
- reference.zip
- Plus tutorial screenshots

A

Blender vehicles

Learn to create impressive sports cars using open-source software

It's good news for all open-source software lovers! A new version of Blender is ready for download. Version 2.64 features many important innovations, including a new mask editor, new nodes in compositing (box mask, colour correction, re-route and more), colour management (Blender 2.63 only supports two colour spaces, linear and sRGB – now many more are supported) and scene loading optimisations for Cycles renders. Also, a new non-progressive integrator has been added, panoramic fish-eye cameras are now available, as well as new mesh tools, plus sculpting improvements. So before you begin this tutorial, download the new free version from www.blender.org now.

Creating a car with 3D software is a great challenge, as there are many details to keep in mind to get good results. The high-beam lights, for example, require accurate modelling. This is particularly true with the inside of the vehicle, otherwise the reflections will not look realistic. Proportions must be as accurate as possible, so it's essential to have good reference images. Ideally you'll use a blueprint with all the views of the car (front, rear, side and top) but often these files are not easy to find (especially for newer car models). If you don't have blueprints, make sure that photo references are well aligned and that the different views are exactly the same size – if necessary, re-size them with the free image editor, GIMP (www.gimp.org). These images will be placed as a background image – one for each view – so make sure they are perfectly centred.

While modelling we'll use Blender's modifiers to simplify work. The Mirror modifier will be used a lot and will enable us to do half the work by taking advantage of the symmetry of the car. The most important rule to follow is the KISS. principle (Keep It Short and Simple). We must not forget to KISS, so during the modelling never add more vertices than needed as the mesh will become unmanageable and each new change could become a disaster.

To reduce the use of RAM and the workload of the video card, it's important to use different layers. For this project, we'll place the wheels, body, interior and stage with the lights on different layers. The design of the car is full of soft lines, so we'll use only the vertices needed and let the algorithm of subsurface do the work for us. Once a piece is finished and the result satisfies us, it's better to put the subsurface of the Viewport to a minimum level.

For all the pieces that have a radial symmetry (such as the wheels), we'll model a single slice and then clone it with the modifier spin. It's important to give the right

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B

thickness to the body of the car, otherwise it will look toy-like. For simple pieces we'll use the Solidify modifier; for more complex objects we'll extrude edges by hand.

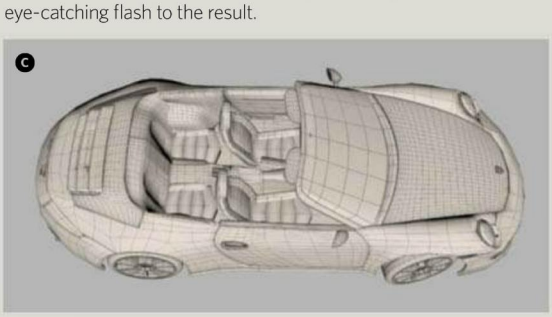
It's very important to save often, especially before making a radical change. Backups use space on the disk, but they will enable you to save valuable time.

Another very important aspect is the creation of good car paint, as luxury cars have three-layered paint with iridescent reflections. Our car-paint material will consist of a Diffuse shader mixed with a Glossy and another Glossy material that will simulate the iridescent reflections. Chrome or shiny materials are composed of a Glossy shader with a different roughness index and two colours blended.

We want a car with a racing look to it, so we're going to add a strip on the hood and the side. Lighting is also crucial: we'll use a big fill light on the car, two front lights (one with warm light and one with cold) and a series of emitter floors that will influence only the reflections of the car paint.

We'll use a three-quarter view as the main image because it's a good way to emphasise the beauty of the car, with the headlights turned on. During rendering we'll save glossy reflections, ambient occlusion images and, with the node editor, create a JPEG with the reflections generated by the headlights. These images are then combined in GIMP.

Blender's node compositor is good, but using graphic-editing software like GIMP makes post-production work more fluid and immediate. The final image is balanced with an AO layer and glossy reflections added to give more detail to the shadows and to emphasise reflections where needed. The very last edit we'll make is the addition of a lens flare on the high-beam light. This adds an eye-catching flash to the result.



C

A The final render. Lens flare was added in post-processing using the free software GIMP

B In this wireframe render the subsurface level has been reduced to make the mesh structure more evident

C A wireframe render of the interior view

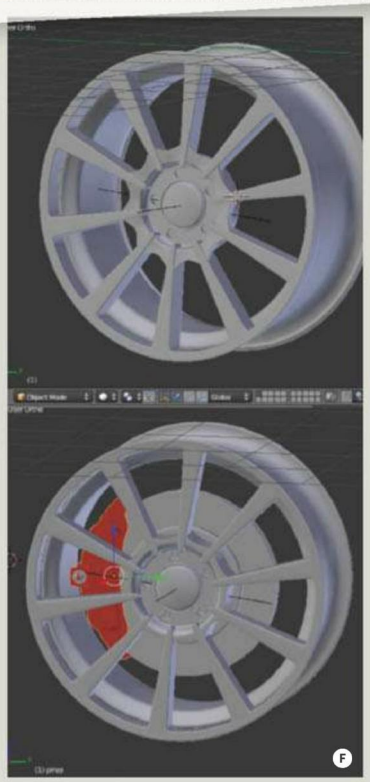
D Reference setup

Create a sports car in ten simple steps...

01 Blender windows

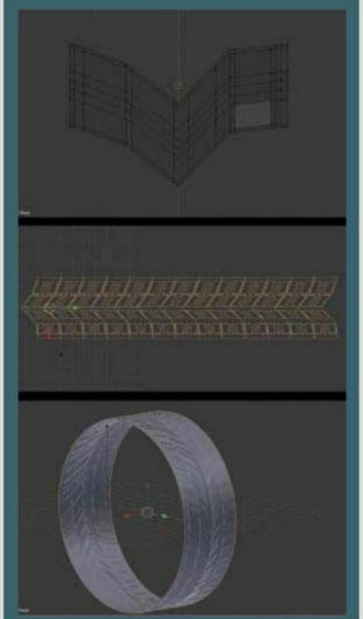
The first step is to set the references images in various windows. Open your reference photos (supplied) in GIMP and make sure they are horizontal and aligned with the floor. Enable the rulers in GIMP and cut the images so that the height and width of the car are the same in the front and rear view. It would be nice to have a picture from the top, but if you don't have one we will need to study the different views to understand the structure of the car. You'll find reference images are supplied with this tutorial, so there's plenty to work from D.

D



Model the tyres

We'll use two modifiers to model the tyres in Blender: Array and Curves. From the top view prepare a slice of the tyre with a tread pattern, apply the Array modifier to obtain copies, add a Bezier Curve of the size of the tyre and use it as a base object for the Curves modifier. Now apply the modifier and extrude the side vertex until you have the correct width of tyre.



02 Model the wheels

Choose the side view, add an empty section at the centre of the wheel, move the cursor to the empty area (Shift+S then select) and add a circle. The wheel has ten spokes, so we'll use a circle of 80 vertexes (three for each spoke and five between each spoke). Model a single spoke and then, with the Spin modifier, we'll create the necessary copies. Remove the double vertices and proceed with the extrusion E.

03 Continue the wheels

Add another circle in the central part of the wheel, scale the vertices to the centre and extrude. Apply some extra cuts to create the holes for the pins. To make round holes, select vertices and hit Shift+Opt/Alt+S. Enable Boltfactory in Blender's Addons (go to File>UserPreferences>Addons> Boltfactory) and place the wheel axles. We'll use a cylinder for the disc brake and then shape the brake caliper. To model the clamp we'll enable a Mirror. The holes in the discs will be added with a texture F.

04 Model some tyres

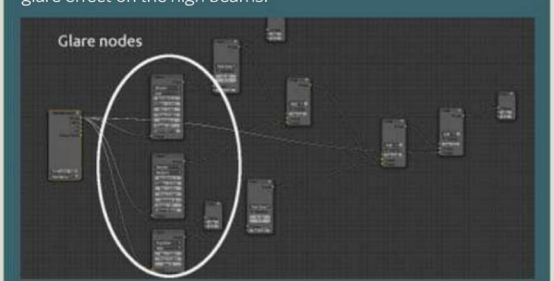
First, create the profile of the wheel then use the spin with the cursor in the centre of the wheel as the centre of rotation. We want the car to have a sporty/racing appearance, so we'll use slick tyres. If you want road wheels you'll have to model the footprint of the tyre and then bend it along a circle G.

05 Add a bonnet and bumper

With the Mirror modifier active, begin to shape the bonnet and the bumper, following the curves of the car as close as possible to the reference photo. It's better not to use too many points, as any changes can make it difficult to maintain the soft curves of the car. Occasionally turn on the level of the wheels and make a clay render to check if your model contains errors H.

Compositing node editor benefits

The node editor is another of Blender's very powerful tools that has greatly improved in the latest versions. We could complete all the post-production in Blender without using GIMP, but I prefer to use the node editor only to create the layers and then export them into GIMP. This way I have more control over the areas to be processed (lights, shadows, sharpening, curves and level adjustments). For our scene it will be used to create the glare effect on the high beams.



E Modelling the wheels – note the empty centre

F Creating the wheel interior

G Final modelling of the wheel

H Be sure to follow the curves of the car as closely as you can

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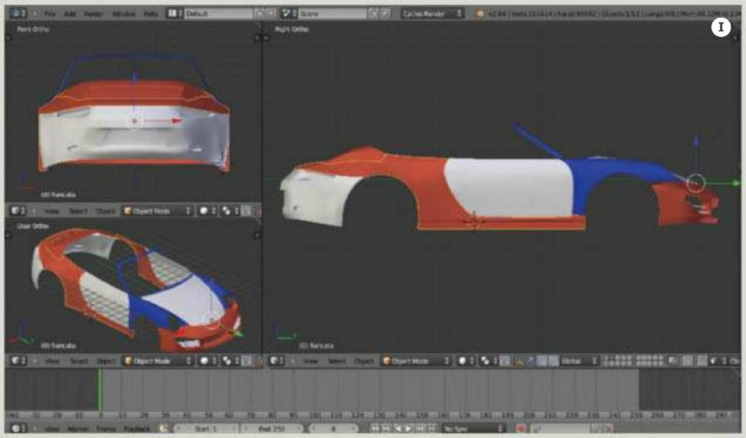
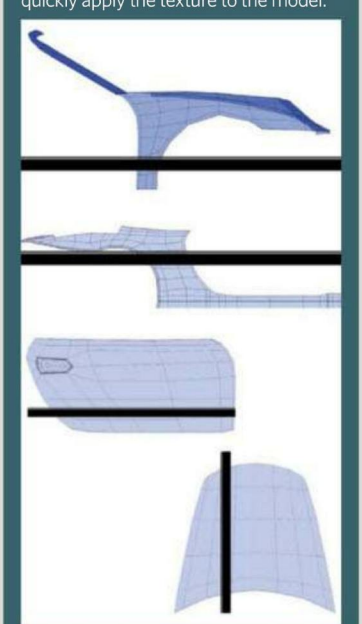


06 Sculpt the car body

Using the same procedure as the previous step, we'll model the side of the car now, including the rear bumper and doors. Be sure to keep the different parts separate so any changes that need to be made will be far easier and save time. Right now it's important to create the shape of the car – the details will be added later. Once you've finished the body, extrude the edges of the meshes to create thickness and activate the Subsurf in Viewport to check if the spaces between the pieces are right. As you can see, all the parts are different colours to highlight the various edges I.

Texture advice

Textures can make a big difference to a 3D scene, meaning with a simple strip, our car has a racing look. I used the symmetry of the car to unwrap the model in a very easy way. Simply go to the side view, select the parts of the body and, in Edit mode, hit U then select Project From View. This way I can quickly apply the texture to the model.



07 Add details

Now we've finished the outer body we'll add more details including door handles, rear wings, the plates, the front vent, the exhaust system and front and rear lights. The front lights are composed of a glass with a mesh inside a reflective material and a spherical light. The rear lights are made of small emitter spheres (LEDs) on a Reflector plane. The correct placement of these elements is essential, so at this stage paying close attention to your reference material is vital J.

08 Model the interior

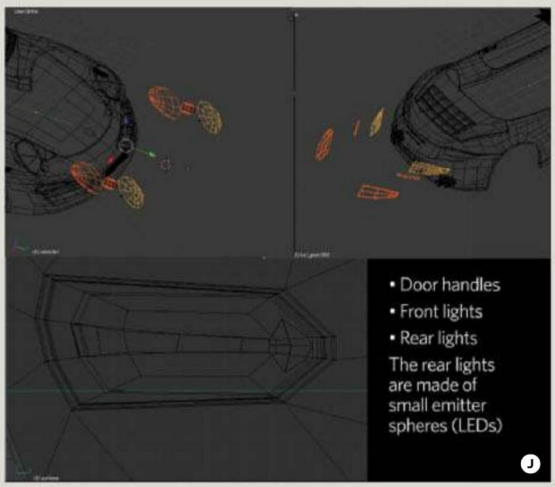
On a new layer we'll now begin to model the interior of the car. Start from the basic plan, then the central transmission tunnel. We'll model the seats in another file and then import the mesh. Add the dashboard, the gear lever, the rear-view mirror and all the details on the inside of the doors. Assign a red material to the interior, apply black to the plastic and give grey to the aluminium surfaces K.

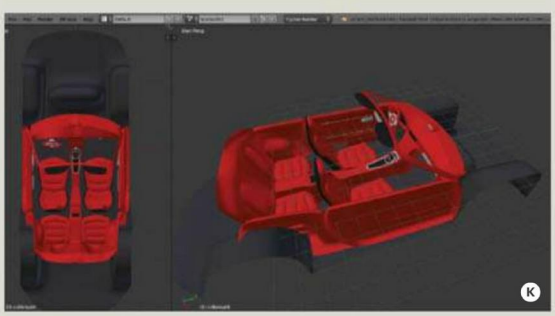
09 Set up your materials

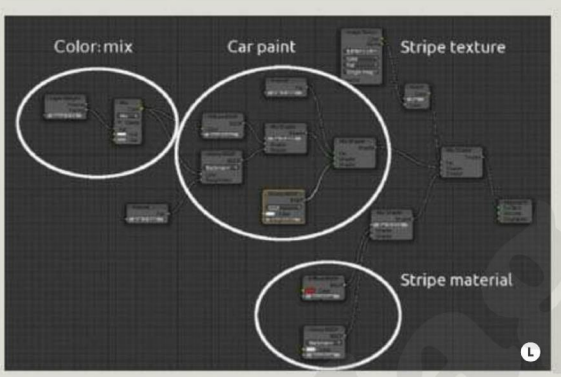
We will use Cycles as the render engine, so first open the node editor to set the materials. The car paint will be a mix of Diffuse and Glossy shaders, both mixed with a Glossy with violet hues. Wheels and aluminium details are a Glossy material. For the seats we'll use a red velvet with a black reflection. The plastic material is a mix of two Diffuse and a Glossy shaders with a Noise texture as a Bump map L.

10 Time to render

After assigning the materials, we'll create the scene for rendering, using a classic studio setup with a rear plane and three-point lighting. The plane will be slightly shiny to give reflections on the floor. The upper fill light doesn't influence the Glossy channel, so we'll use other lamps only for glossy reflections. The front lights are both warm and cold lights to make the image less flat. We'll need extra channels for the post-production stage, so go to the Layer menu and enable the AO and Glossy direct channels. After rendering, open the image, the Glossy channel and AO pass in GIMP, and overlay them to obtain the final result M.







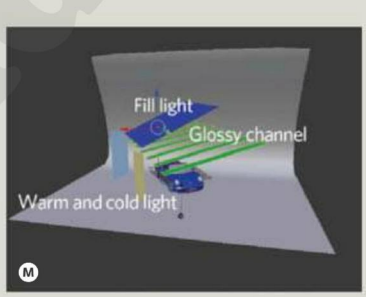
I Car body meshes

J Mesh details

K Detailing the interior elements of the car

L A map of the car-paint material

M Use a simple setup for the lighting



3DArtist Questions & answers

Welcome to the Q&A section where we answer many technical quandaries in the most popular 3D programs including ZBrush, UVLayout, Maxwell Render and LightWave

Need help fast? Join the

The advisors

ZBrush
Maarten Verhoeven
http://mutte.cghub.com

Maarten is a freelance artist from Belgium. A 3D sculptor with a passion for concept art, he currently works within the toy, VFX and videogame industries

UVLayout
Dmitry Denisov
www.dmi3ryd.com

Dmitry is currently working at the Kaspersky Lab as a web designer. 3D is a hobby that he finds himself spending all of his free time dabbling with

ZBrush, Photoshop

PolyPainting tips & tricks

"Can you teach me an effective way to add convincing texture and detail to characters?"

I don't tend to make many coloured renders, but when a client asks for a coloured concept piece I prefer to use the BPR render engine in ZBrush, using PolyPaint to paint the textures onto the sculpt by hand. Depending on what the creature's skin should be, always look for reference. In this case I've sculpted a vampire so I went looking for pictures from vampire flicks and various movies.

In this short walkthrough I'll try to give you an insight into how and why I use PolyPaint to apply skin details and give a quick breakdown on the render passes used in the final image.

To begin, studying a selection of examples is key for me. When I'm comfortable with the basics I like to play and experiment. You could jump in and see where you'll land, but it isn't always easy to backtrack and repeat your steps if needed at a later stage, or on a new project.

It can take a little while until you find the painting technique that works for you, but in this example it's a matter of putting a few layers on one another. The first steps will show how I paint the textures using PolyPaint and Spotlight in ZBrush. We'll then fill in the sculpt and paint details, like skin blemishes and freckles.

ESTIMATED TIME TO COMPLETE THE TUTORIAL

30+ MINUTES

With the Disc

- **PolyPaint nosferatu.ztl**
  A clean copy of Maarten's ZTool to follow his steps and practise your PolyPainting techniques

Material tricks

When you're PolyPainting try to use the standard MatCaps like SkinShade4 or Basic Material. These are often the best to use for judging your paint work, or any material that hasn't got a colour baked into it. This is handy if you're looking for something special like a reflective shader.

growing community at www.3dartistonline.com

Maxwell
Ross Board
www.rossboard.co.uk

Ross is a design and planning specialist currently working within the renewable energies sector. He has plentiful experience with high-end arch vis

LightWave
Cody Burke
www.lightwave3d.com

LightWave editorial lead Cody Burke has stepped in to teach us a few of his tips for achieving precise fracturing results with Bullet Dynamics

Send us all of your 3D problems and we'll get them sorted. There are four methods to get in touch with our team of expert advisors...

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01 Fill with a base colour

Make a colour fill to start painting on. Pick a colour and go to the Color tab. Open it and select Fill Object, making sure that only RGB is turned on. If M or MRGB is on, it will not only apply colour to your model but also the material/MatCap that is assigned at that moment. This isn't easy to work with when you want to crack out render passes at a future stage. Now you can start painting with PolyPaint (A).

02 Apply the main colours

I paint in some main colours that I've selected from references. Use the standard Alpha 24 and 25 with the Stroke mode set to Spray. It works a bit like an airbrush, where you put layer on layer with a low intensity. Combine a big brush size to fill in the large area and a smaller one for defined, dotted areas. Whiten the face, apply a purple/black around the eyes and a red around the nose, ears and mouth. If you want to apply sharper lines, use a Standard stroke with a smaller Alpha (B).

Paint extra details like veins and make the side of the eyeball darker. We want to make it more intense!
Use Spotlight to transfer your reference images to your model
C

03 Spotlight the eyes

Select your SubTool and load a texture via Spotlight. Go to the Texture tab and load your reference, then add it to Spotlight. To toggle Spotlight on and off hit Z, or Shift+Z. Move and scale the picture with the Spotlight Dial to the correct place, drop it on the canvas with the shortcut and paint your eyeballs. Apply some extra veins and clean up parts of the texture that don't work. The standard material used for rendering eyes is often the Toyplastic MatCap (C).

04 Cavity and AO masks

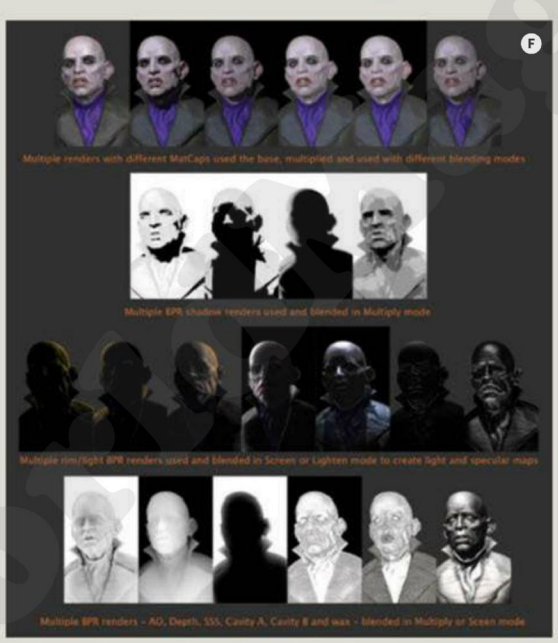
The Cavity and Ambient Occlusion mask features add some extra colour and dirt details into the cavities and wrinkles. When a mask is applied, turn off Visibility, colour pick a darker tone on your sculpt and paint in the cracks and creases with a very low RGB value. You can colour in too much, so keep working in transparency, building colour on colour (D).

05 The devil's in the details

I paint in some very opaque veins and freckles on the skin with the Standard brush, Alpha 38 and using a low RGB intensity with purple, red and brown tones. Try to break the symmetry of your texture with the details (E).

06 The final milestone

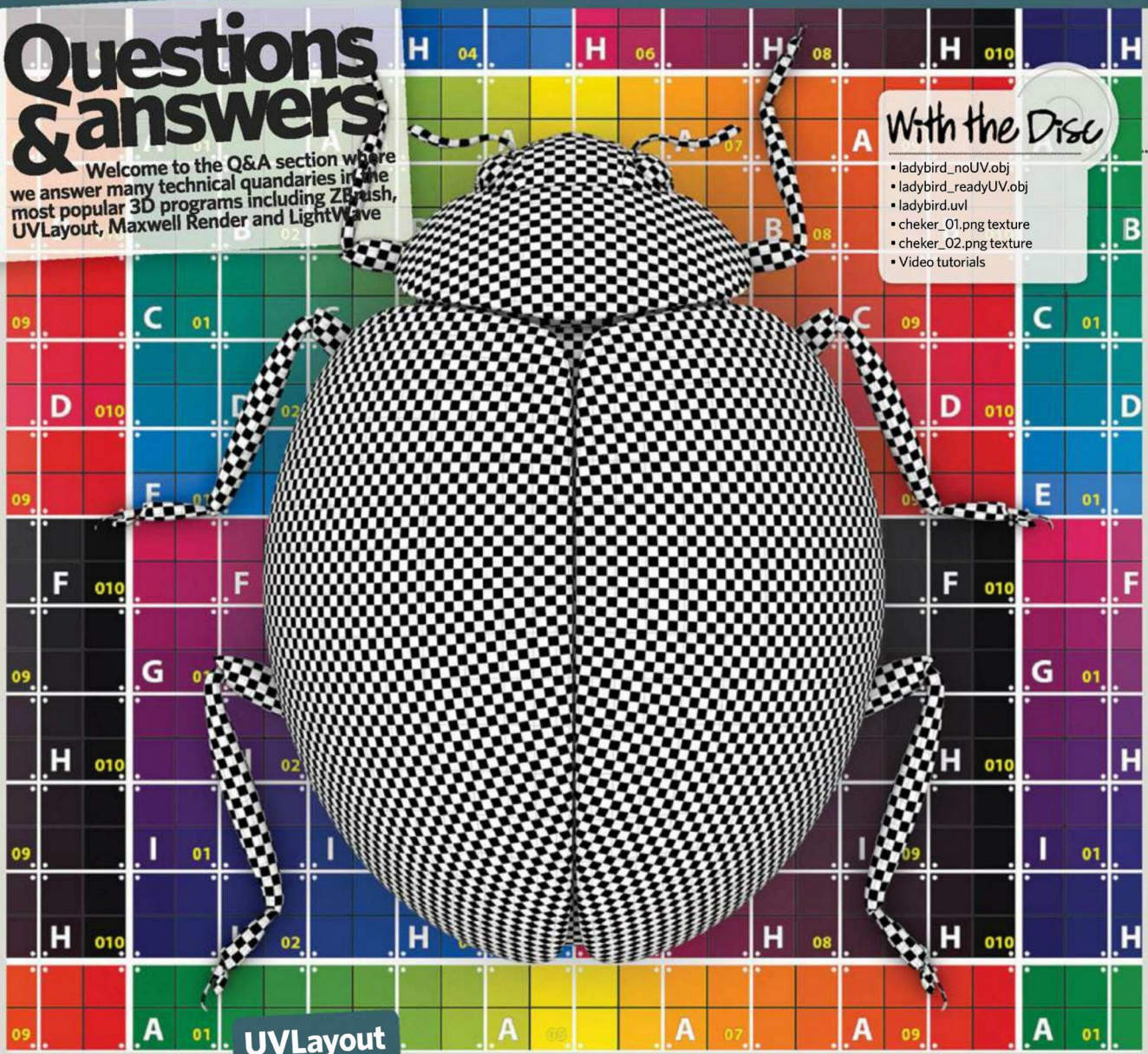
The image is composed of different render passes with and without PolyPaint turned on. First some Standard BPR renders and shadow passes with MatCaps are used in Multiply mode. Rim light renders are mostly metal or shiny MatCaps, so you can easily move your light around your ZTool. These are used as layers in Screen or Lighten mode. The Wax, Cavity and SSS renders are used to colourise and make your cavity details pop. Last I use a BPR mask and BPR Depth map to add DOF using Lens Blur in Photoshop. I combine these with a hand-painted backdrop (F).



Top tip

To ensure that your object doesn't move or rotate while creating the render passes, save everything as a ZBrush project file. If you've chosen a camera angle that's moved, reload the project and everything will be in the same position as you last saved it. It's a nice trick to make some extra render passes when you're working.

Welcome to the Q&A section where we answer many technical quandaries in the most popular 3D programs including ZBrush, UVLayout, Maxwell Render and LightWave



With the Disc

- ladybird_noUV.obj
- ladybird_readyUV.obj
- ladybird.uvl
- cheker_01.png texture
- cheker_02.png texture
- Video tutorials

UVLayout

Perfect UVs in UVLayout

"How can I work with UVLayout to create effective UVs?"

UVLayout is a very powerful tool that enables you to quickly and easily create high-quality UVs with low distortion on your models. The application can work as a standalone program or as a plug-in with a primary 3D application. UVLayout also enables you to work with polys and subdivision surfaces. Personally, UVLayout is the best tool I've used for this task and I hope to show you why. You can download a trial for the software at www.uvlayout.com.

This short tutorial will take you through the steps to help you work with the UVLayout interface and main hotkeys, place seams to create low-distortion maps, create a UV map and apply it to objects, cut or weld shells in the UV Editor, group parts to one box and finally pack groups using the tile options. I've also recorded three video tutorials (supplied) where I discuss basic primitive unwrapping, working with the Copy option and fully unwrapping a ladybird and creature head.

01 First steps

First we'll load the 'ladybird_noUV.obj' (supplied) in UVLayout. For more comfortable work with the model, hit Space+MMB to move and separate all parts to a different position (1). Our model is symmetrical and we'd like to activate it, so go to Edit and press the Find button. Click LMB in the centre of the model and hit Space to activate Symmetry. This will greatly decrease the selection time and improve your workflow. Using the G button, double-clicking on the geometry to mark it (double-click Shift+G will deselect the shell). Select all the small parts, click H and then G to hide the selection (2). Now it's time to make seams for unwrapping. Use C to make a selection, W to deselect edges and make seams for future unwrapping (3). Depending on what you're creating UVs for, you can create one large UV map with distortion or use small UV pieces with no distortion. Right now, we can make UVs for future projection painting with a large amount of UV shells. With this object, the head seams are the hardest part of unwrapping (4). Once you've finished, drop all of your geometry to the UV Editor using the D button A.

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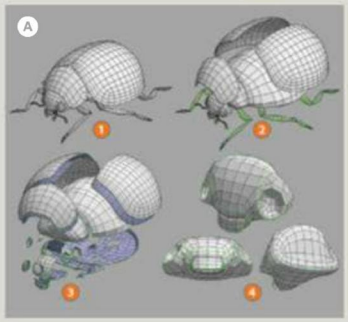
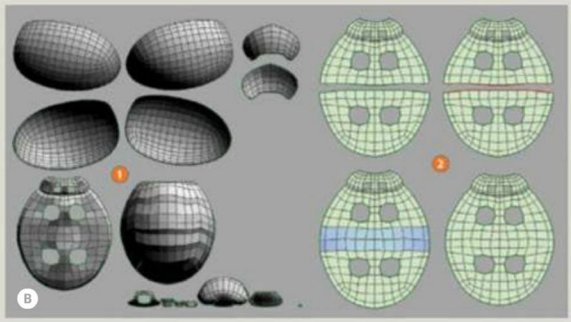
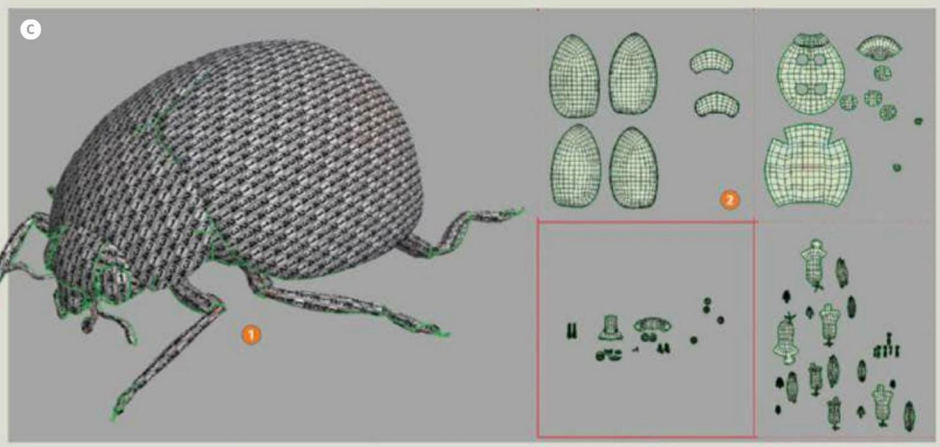






02 Unwrap geometry

Now to unwrap our dropped geometry (1). Press 2 or E to go to the UV Editor. As we have a small quantity of shells, we can manually unwrap each of them. Move the cursor under each shell, hold F until you like the result, and all areas will turn green. As we activate Symmetry after unwrapping, alignment will become accurate. If you have problems with incorrect or very strong distortion, try to use Shift+F. This option first stretches geometry after unwrapping. To move the shell press Space+MMB, to rotate hit Space+LMB and press Space+RMB to zoom in.

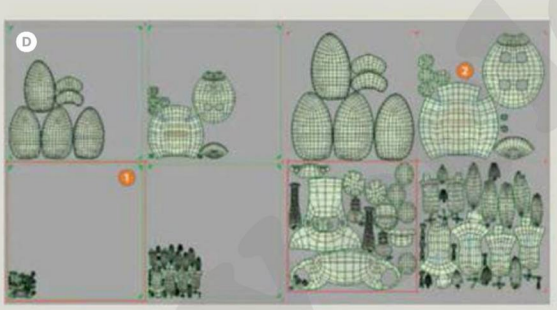
Here we'll focus on a couple of useful tricks. You can manually cut and weld shells using the C and W buttons. To cut an edge, simply move the cursor under and press C. If you start to do this in the centre rather than from the border, for example, this will create a loop. Hit Enter to separate a part, but if you don't like the result, try to cut some edges to improve shell tension. Use magnet (M) to snap one part to the other then press Enter to merge to one shell, then hold F to relax the new geometry (2) B

03 Unwrap all the details

Continue with other parts of the ladybird until you see 'Nothing in ED' in the editor. In the 3D Editor press T twice to place your texture and + to increase tiling. This will need to align the textures correctly. I recommend you use one global direction for more comfortable projection painting and future texture editing (1). Now we need to separate all the parts and pair them up. For example, we can combine all the legs into one UV square, as well as the head, eyes, whiskers and so on. This can improve image quality because we have more space for textures. Combining texture parts can improve your workflow and make the process more comfortable. Now we have four squares with ready-to-pack shells (2) C.

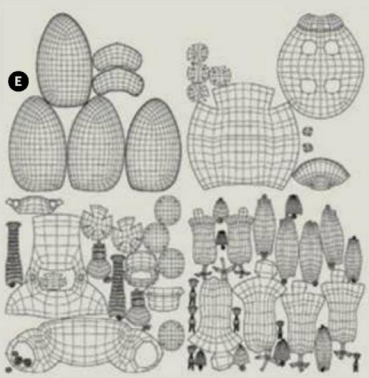
04 Re-scale and pack

Now we'll create four packing groups. Drag a selection under the first square, go to the main Pack menu and select New Group. To see a difference, drag one of the four green arrows with Cmd/Ctrl+RMM and you'll see a result. Do the same for all the groups. As you can see, when you drag the green arrow, UVLayout tries to find the best way to pack UV shells. In the Pack option click Delete All to remove all your groups. If you have a large amount of UV shells, a better way is to use the option Fit To Sqr, which you can find in the Move/Scale/Rotate tab. This will bring all the shells according to the UV square and fill the maximum UV space. Click the Rescale button to make all shells one size. After that, try to repeat the option Fit To Sqr, or you can manually select and scale each group D.



05 Make final adjustments

To make all of the UV shells local size in Move/Scale/Rotate, click the Local button. On the top of the main menu find the Send button and click it. Return to modo and click Import From UVLayout. To finish up, we can create a UV map wire and render it. This may be helpful if you'd like to manually draw textures. In the main menu open the Edit tab and click on the Auto Fit button. Find Render and open it. Check the AA Lines, disable Outline, choose the resolution you need and click the Save button. If you'd like to make a wire, for example with a 1.1 value, drop any unused shells with Shift+D, click the Auto Fit button and render it E.



06 Use tricks and hotkeys

If you have a large number of UV shells and you need to separate different parts to other places, you can split the panels. For example, in the left screen you can choose the UV Editor, and 3D view from the right screen. This increases your workflow and makes work more comfortable. Under Display, find the green button Split Pane.

Most-used hotkeys:

ED mode
C – cut
Shift+C – UV space

UV Editor
F – flatten shell
L – lock shell
M – magnet selected edges
Enter – split or attach shell
Shift+I – straight to line
R – convert to rectangular
5 – paint expand
B – flatten brush
P – pin border
Shift+P – unpin border

3D mode
T – change texture type
+,- – change tiling texture

Global keys
Home – centre screen on selection
H – hide tool
G – paint selection

Welcome to the Q&A section where we answer many technical quandaries in the most popular 3D programs including ZBrush, UVLayout, Maxwell Render and LightWave

ESTIMATED TIME TO COMPLETE THE TUTORIAL
2 HOURS

Maxwell Render

Shed light with Maxwell

How can I create and illuminate a studio scene using Maxwell Render?

Little is written about Maxwell Render in comparison to the other big-hitter rendering engines – mental ray and V-Ray. However, in my opinion, I can say without a doubt that Maxwell Render is one of the most powerful (albeit understated) rendering technologies on the market.

In this tutorial we will be discussing the principles behind lighting a simple studio scene with Maxwell Render and 3ds Max, using both object- and image-based lighting while investigating the innovative Multilight technology. We'll use this to eventually relight and recolour the image during the iterative render processing.

We will be using renderer-agnostic terminology wherever possible, discussing the process from a photographic point of view to help you understand the principles behind the lighting setup – not just the render settings.

When using Maxwell, there is a fundamental difference that should be understood, as it makes the package completely unlike that of anything else on the mainstream market: unbiased rendering. Where common rendering engines such as mental ray and V-Ray have a defined number of light bounce samples, Maxwell does not. Theoretically it bounces an infinite number of light rays – which is scientifically true to life.

It's important to note that a ray of light will not bounce a defined number of times then draw a conclusion, as per mental ray or V-Ray. It will theoretically bounce until its intensity reaches near-zero levels. This highlights every nuance of the surface that's being impacted.

While this does mean beautiful, scientifically correct renders, it can also mean long render times. It's important to understand the correct parameters required in Maxwell Render so as to mitigate this problem. All this will be discussed later in the tutorial.

Maxwell Render comes very well-equipped out of the box, featuring a few helpful HDRI and MXM files (Maxwell's proprietary material-sharing format). However, for the duration of the tutorial we will be referencing materials downloaded from the Maxwell Online Resource Library (http://resources.maxwellrender.com), which features thousands of free files uploaded by the dedicated Maxwell community.

For users that may not have the financial resource to purchase Maxwell Render outright, there is a fully functional (watermarked) 30-day trial available from the website: www.maxwellrender.com. This should be enough for this tutorial and to help you get a feel for the things Maxwell Render has to offer. For more extensive work, I would recommend a full copy of Maxwell Studio.

Although this article focuses on 3ds Max with Maxwell Render, all techniques discussed are relatively universal and 99 per cent of the settings mentioned can be applied to the other host programs that Maxwell Render is able to run as part of, such as Softimage, Maya, SketchUp.

Change the mood with Multilight

One of Maxwell's many talents is the innovative Multilight technology, allowing users to relight and restyle an image as it renders – something that is no doubt helpful to pass the time during long unbiased rendering sessions. This technology is fantastic for quickly prototyping looks within an image, without having to wait for repeated renders. You can also fully animate by way of keyframes using Maxwell's built-in Timeline. This is a great way to present different looks to clients and determine the most effective output.

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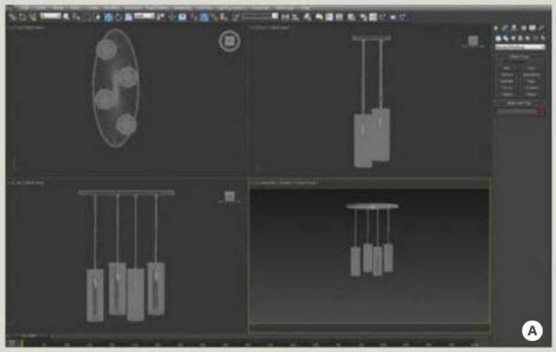
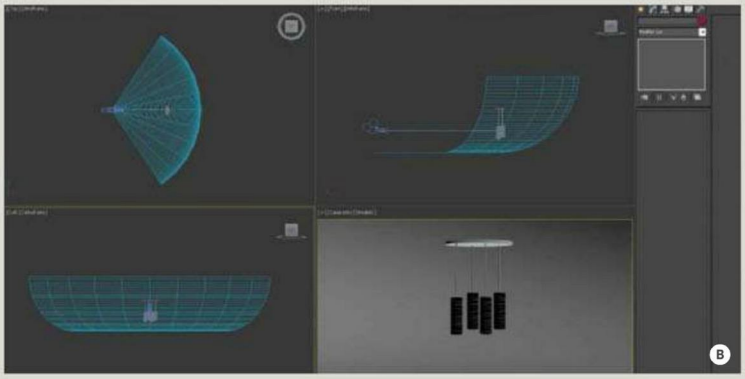


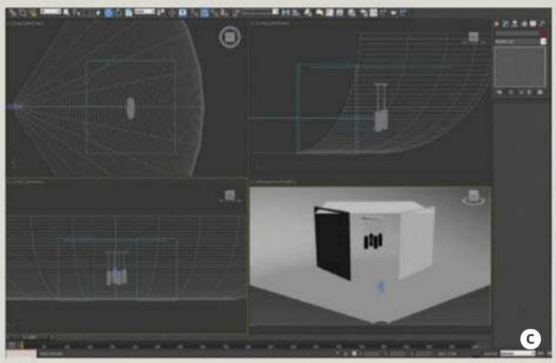
01 Import geometry

For the purposes of this tutorial I will be using a commercially available Evermotion light fixture model from www.evermotion.org. However, there is a free alternative available from DesignConnected.com if you don't have a similar model of your own to hand: http://tinyurl.com/dcpendantlamp. Import your model of choice into a new scene and check its geometry. Once in place, open the Render Settings dialog and under the Common tab enable Maxwell Render as the production render engine. This will cause Maxwell Render to become live and instigate some changes in the Material Editor tab that we'll need for the next steps A.



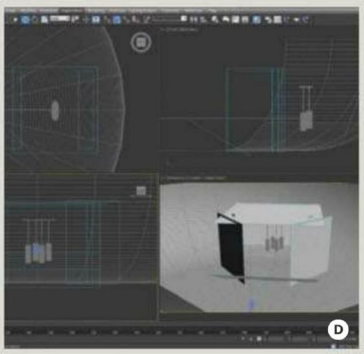
02 Create a backplate

To create a backdrop as seen in professional photographic studios, make a large plane with many segments (8 x 8m, 40 x 40 segments should suffice). Next apply two limited Bend modifiers – one to create the vertical curve and one to envelope the model. Once these are in place we will begin to implement another photographic technique: three-point lighting using fixed planes. This aims to mimic real-world softbox lights B.



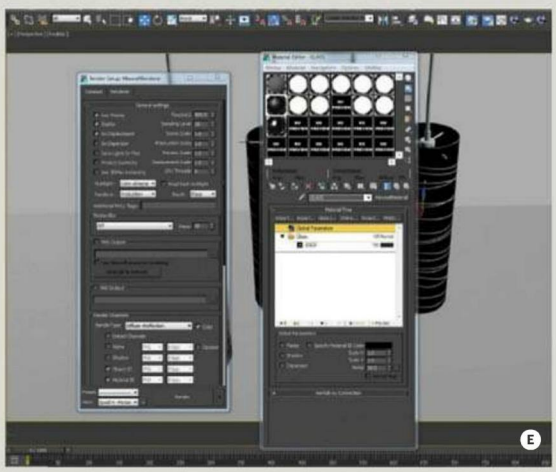
03 Position lighting planes

Position three planes around the model. Using the three-point-lighting technique create a Key, a Fill and a Backlight plane. Open the Material Editor, load a blank Maxwell Material from the library, delete the preset BSDF layer and add a new Emitter layer. This enables the material as a light source. Choose a simple preset C.



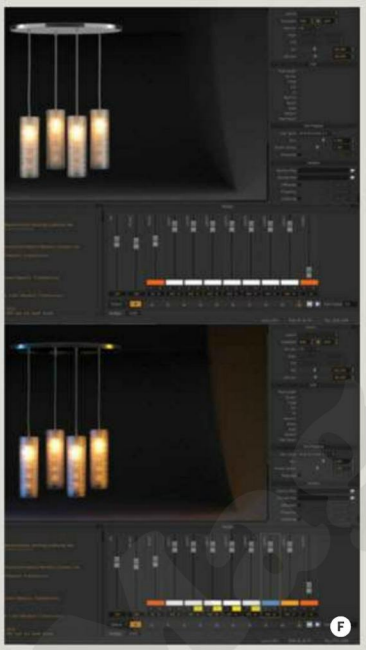
04 Adjust your lights

Add extra lights so as to appropriately highlight the nuances of the model; these can be turned on and off using the Maxwell Multilight function at a later stage, so it's not necessary to spend massive amounts of time refining colour or intensity. However, it is important to remember that each light plane should have its own light-emitting material designation D.



05 Add materials and set up the renderer

Once all of the appropriate lights are in place, assign materials to the light fixture using in order to illuminate the bulb. We will be utilising the same technique of applying an Emitter material with the filament bulb preset set to 60W. Use the Maxwell Material Library preset for Frosted Glass and apply this to the outer element. Finally, open the Render Settings dialog, set the desired render time and Sampling level for Maxwell Render (higher equals better results), enable Colour+Intensity mode in the Multilight parameters and hit Render E.



06 Rendering and post-production adjustments

When you click Render, the Maxwell Render window will appear and begin the iterative rendering process, updating the on-screen image periodically. While waiting for render, you can begin tweaking the light settings from within the Multilight dialog. Tweak this until a desired result is achieved and all that is left to do is wait. My image was rendered just once and relit three times post render. Render times are far from quick, however, with an acceptable final (noiseless) image taking eight hours to process on an i7 Hex-Core machine F.

Questions & answers

Welcome to the Q&A section where we answer many technical quandaries in the most popular 3D programs including ZBrush, UVLayout, Maxwell Render and LightWave

With the Disc

Full Content used to create the tutorial, including LWO and LWS files plus JPEG textures, tutorial screenshots and a full MP4 render

ESTIMATED TIME TO COMPLETE THE TUTORIAL

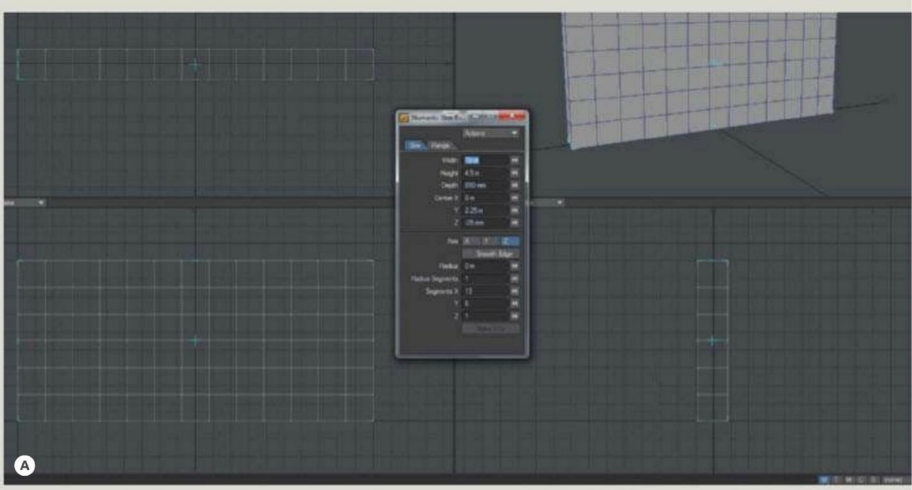
25 MINUTES

LightWave

Control fractured objects

How do I control exactly where an object will fracture using Bullet Dynamics in LightWave 11?

Breaking up and destroying CG objects is a common requirement in visual-effects work and animation projects. However, controlling the precise location of the effect is often out of reach for many artists, which can be frustrating. With LightWave's extremely intuitive and very powerful Bullet Dynamics System, it's easy to control precisely where an object will break after it has been fractured. For example, by referencing a single null on a simple gradient, you are able to achieve the exact result you are looking for in a timely manner. This gives you much more control over your final effect, which is essential if you're a perfectionist. So, let's jump right in and get started.



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01 Prepare the model

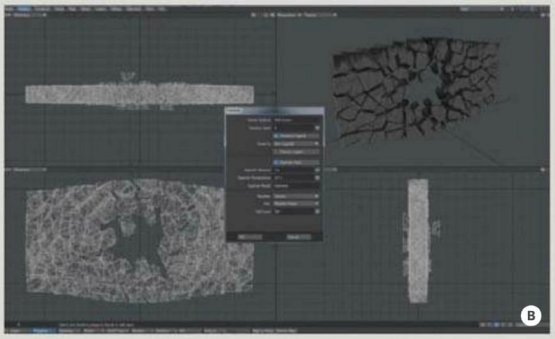
When setting up your model to be fractured, it's important to maintain an even amount of space between each of the segments. Also note that the Fracture tool works best on objects that are not too large or too small. The exact settings I used for the wall are shown in the numeric panel in the screenshot A.

02 Fracture the wall

Now we can run the Fracture tool by going to Multiply>Destroy>Fracture. The main settings to change in this panel are the Cell Count to 256; check Explode Parts, and then click OK. Go ahead and delete the original copy of the wall, or paste a few of them around the fractured wall to build up the scene, as I have chosen to B.

03 Set up the scene

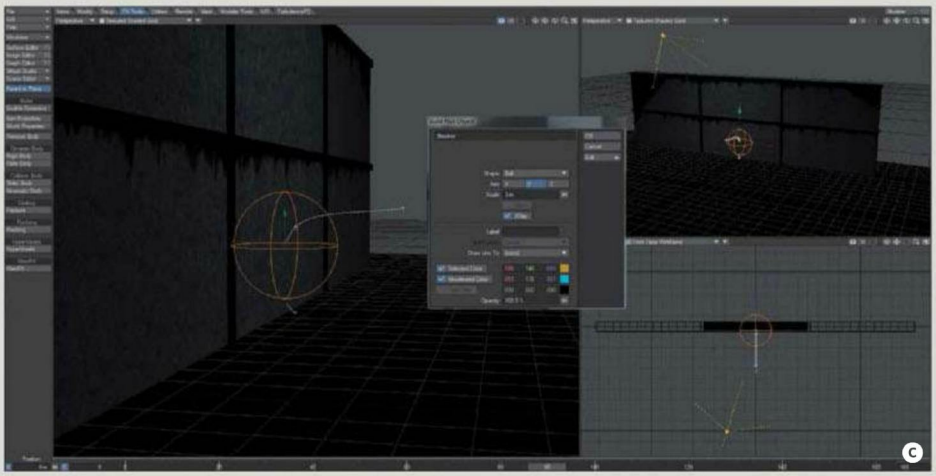
Next add a Null for later reference as the breaker for the wall. When the Build Null Object window appears, twirl down the Edit option to adjust a few of the settings. Change the name to 'Breaker', the Shape to Ball and the Scale to 3m. Now scrub through the Timeline at intervals of 40 frames, then move the Breaker halfway into the wall and back out again C.



B

Exploded morph

After fracturing, you'll notice in the lower right-hand corner of the interface that there is an M icon that represents all the morphs for that object. We now have an Exploded morph that can be easily animated using the Morph Mixer. Simply send the object to layout and go to the Properties>Deform>Add Displacement>Morph Mixer. Select the Exploded morph and scrub through the slider to watch the effect take place.



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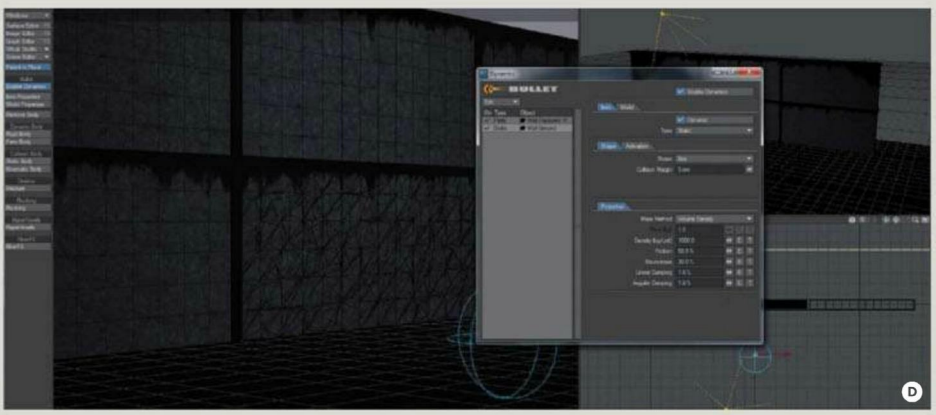
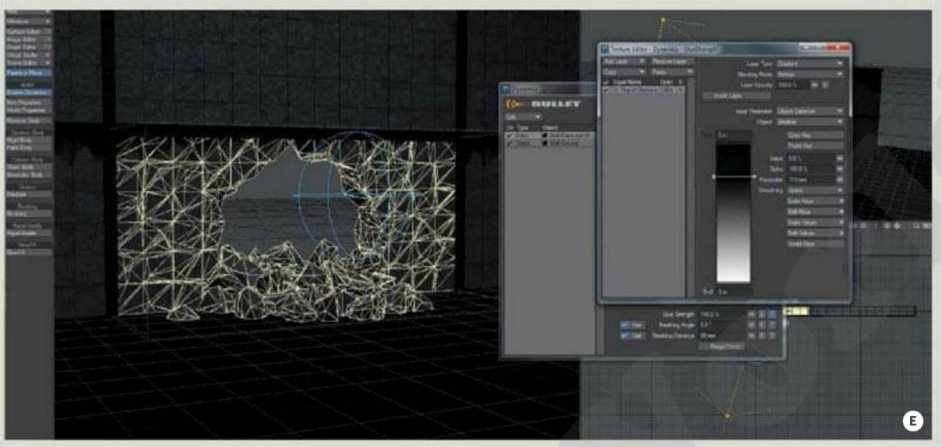


D

04 Establish the dynamics

Now we need to set up the Bullet Dynamics. To do this, simply select the Fractured Wall layer and go to FX Tools>Dynamic Body>Parts Body, pick the ground and choose Static Body. Make sure that Enable Dynamics is turned on, then open up the World Properties. Inside the Bullet window, the first thing to do is go through each object and set the Collision Margin to 5mm. Just for the ground, change the shape to Box. You'll find this provides a smoother and far more accurate calculation when continuing with the fracture D.



E

05 Control the break

Select the fractured wall and set the Glue Strength to 100% to hold all of the pieces together. Next click on the T next to Glue Strength to open up the Texture Editor. Set the Layer Type to Gradient, the Input Parameter to Object Distance and select the Breaker for the object. I changed the End amount of the Gradient to 3m since that is the size we made our bounding sphere when creating the null. Select the first key and set its Value to 0%, then create two more keys. Set one of them to another Value of 0% with a Parameter of 715mm and the last to a Value of 100% with a Parameter of 3m. You should now have an accurate fracture in your wall E.

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On the disc

EXCLUSIVE
30-DAY MARI 1.5 trial

Image © Daniele Orsetti

MARI 1.5's new and unique features will make 3D artists feel at home in no time

MARI 1.5 £1,200/$1,980 US

The Foundry team has polished its production-proven software. 3D texture painting has never been so easy!

MARI is still a relatively new software, but it has quickly become the new standard for texture artists working in the VFX industry. The software has been tested directly by professionals, so it has been designed to perfectly fit in a production environment. It can handle high-res models and hundreds of textures of up to 32,000 pixels per model, over many layers.

The first impression when you open the program is that it's designed to help the texture artist focus on their work, without worrying about technical issues. The interface is clear and fully customisable: you can move around the palettes in the main interface or create new floating windows with them. MARI also has a HUD system to help you keep track of everything – the channel, shader or object you're working on, for example – and gives you tips about the tool you're using.

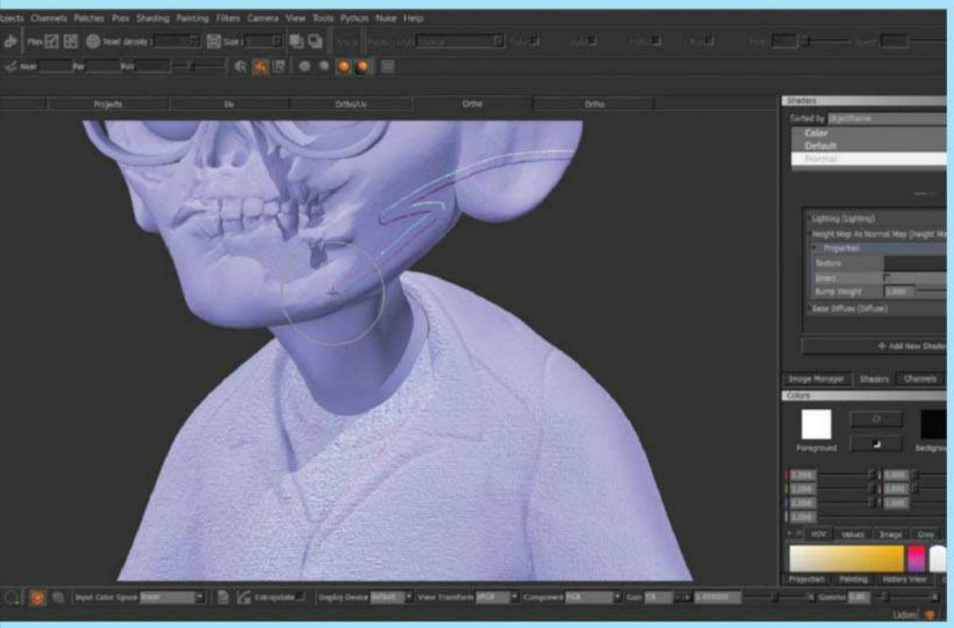
We found the Pie Tool interesting: a circular menu where you can put your favourite brushes and tools, which pops up via a shortcut command. Handily, all the shortcuts in the program are also fully editable.

For someone new to MARI, the software is intuitive and easy to understand. Most of its tools and features will sound familiar to artists, since they are very similar to the Photoshop ones – layer blending modes, a custom brush palette and Clone Stamp and Warp/Pinup tools, for example. The general impression is that the developers took Photoshop as a starting point for many tools, and then tried to improve them and make them more flexible for a 3D artist's texturing workflow. For instance, the Spline Warper tool is very similar to the Warp tool in Photoshop, but in MARI its grid can be edited at different resolutions, letting you work with as many points as you need.

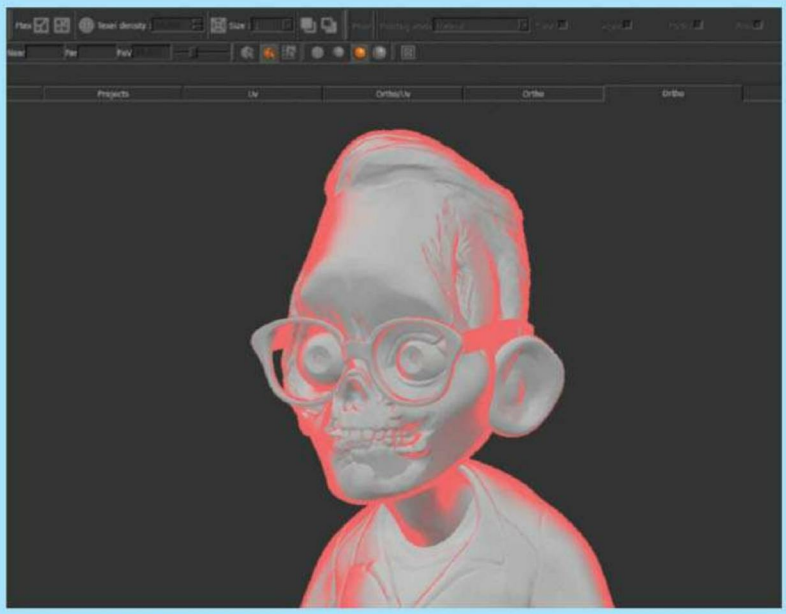
MARI also includes new and unique features. For example, it doesn't paint directly on the mesh surface like Mudbox, but rather on a paint buffer. This is essentially a plane on which images are projected before being baked onto the model. This may sound complex, but since the paint buffer remains editable until you bake it, you have more control over the images you project, saving time in the long run. Another handy feature is the projection mask, which enables artists to protect part of the model during the baking phase; for example along the mesh edges – very helpful when avoiding pixel stretching!

The software can also handle multiple objects and several variations for each one individually, which helps to keep the workflow flexible in case of model changes. Animation data is supported as well.

Version 1.5 enhances MARI's toolset and adds more functionality to it. Overlapping



MARI 1.5 lets you quickly create Normal maps, converting Height maps through a shader module



Using the Edge Auto Mask can help you achieve cleaner projections more quickly

UVs are now supported, enabling you to use the same texture on models that share the same UV space. This feature, along with a new shader module that converts Height maps with Normal maps, might be very useful for videogame artists.

The connection with Photoshop is also now stronger than ever: in version 1.4 The Foundry added the ability to import the layers of a PSD file as channels. In version 1.5, you can now import your custom ABR brushes, so you can keep working with all your familiar tools. The Paint Through tool has been improved, giving the ability to use an image's luminosity as a stencil to project colours onto the buffer.

Right now, MARI is perhaps the best software solution for texturing. Its only weakness is that it needs a very powerful PC to operate effectively, and at the moment it does not support ATI cards. It can sometimes be difficult to handle shader modules and channels – especially at the beginning, as users can get a little lost with all the freedom that the software gives them. However, the team at The Foundry was kind enough to have a chat with us about the upcoming releases and we're confident that most of these weaknesses will be resolved in the coming months. We recommend trying this software, if you're serious about texturing.

The good & the bad

- ✓ Can handle hundreds of high-res textures
- ✓ Flexible and easy to learn
- ✓ Comes fully integrated with Adobe Photoshop
- ✗ Demanding system requirements, such as a Quad-core processor, 250GB disk space (50GB for a small project) and 4GB RAM

Essential info

Price: £1,200 / $1,980 US

www.thefoundry.co.uk/products/mari

OPERATING SYSTEMS

- Windows 7 64-bit, or a Linux 64-bit operating system (Fedora 12 or Red Hat Enterprise Linux 5.4)

OPTIMAL SYSTEM REQUIREMENTS

- Quad-core processor
- 250GB disk space available for caching and temporary files (the minimum is 50GB if you're working on a small project)
- At least 4GB RAM
- An NVIDIA graphics card with at least 1GB of RAM and OpenGL 3.0 support

You can change the solution of the Spline Warper tool to better control the deformation of your painting

Our verdict

Features	9/10
Ease of use	9/10
Quality of results	10/10
Value for money	9/10

> This software has no rivals at the moment and we highly recommend trying it!

Final Score 9/10

Workflow

G-Technology G-RAID with Thunderbolt

A pricey but high-performing external storage device for Apple users

The G-RAID is an external storage device with a particularly stylish appearance, containing a pair of 3.5-inch Hitachi desktop hard disks. It has a silver-aluminium case that so closely resembles parts of a Mac you could be forgiven for thinking this product was made by Apple. This is especially fitting considering the G-RAID uses Thunderbolt, a high-end IO interface that is slowly gaining support on PCs, but one that only Apple includes as standard on all its computers (except the Mac Pro) from 2011 onwards.

Thunderbolt is much faster than USB. Its 10Gbit/sec of bandwidth is more than double the 4.8Gbit/sec (theoretical) speed of USB 3, which is only available on newer computers and over twenty-times faster than USB 2. Thunderbolt also permits the daisy-chaining of devices, so you can connect up to six peripherals to a single port on your computer.

The two disks can be configured as a striped or mirrored RAID array. Unlike other devices that come with built-in software, the G-RAID's disk array is configured using your computer's operating system. If you're using a Mac this is done via Disk Utility. If you're working on a Windows machine, you'll need to go to Computer Management.

The G-RAID with Thunderbolt is clearly targeted at Apple users, but if you wish to connect it to both PCs and Macs, you'll run into an issue when formatting it. NTFS cannot be written to by Macs and HFS is unreadable in Windows. In this case you either need a third-party application or to use the older FAT32 system, which can only handle limited file sizes.

We measured the G-RAID's performance using a 2011 iMac with a program called Blackmagic Disk Speed Test. The Mac's internal disk achieved an average transfer rate of 102MB/sec, while a USB hard disk was limited to just 30MB/sec write and 34MB/sec read speeds. The G-RAID averaged a highly impressive 280MB/sec, at both reading and writing.

A major downside to Thunderbolt is the steep cost, as even the cables are almost £50. Compared to the current cost of standalone hard disks, the 8TB G-RAID with Thunderbolt, which costs £575, is better value than this 4TB version.

The G-RAID's high-quality aluminium casing makes other external storage products look bland and cheap in comparison

Along with the two Thunderbolt connectors and a power switch, there's a Kensington lock at the rear for added security

G-Technology's attention to detail is evident from how the thickness of the casing roughly matches the thickness of an iMac stand

Our verdict

Price: £450 (4TB) £575 (8TB)
www.g-technology.com

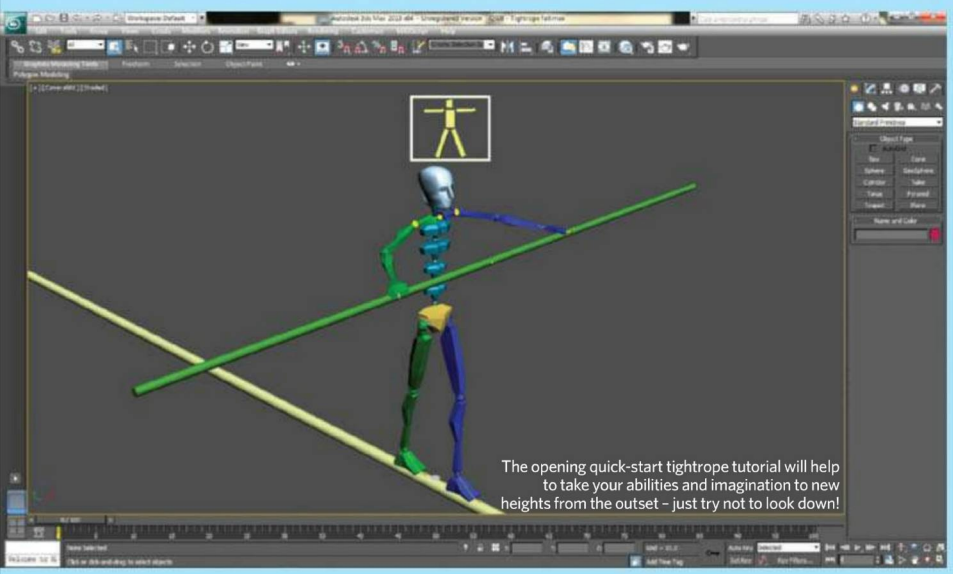
Features	9/10
Ease of use	9/10
Build quality	10/10
Value for money	6/10

"For quality external storage with your Mac, the G-RAID with Thunderbolt won't disappoint"

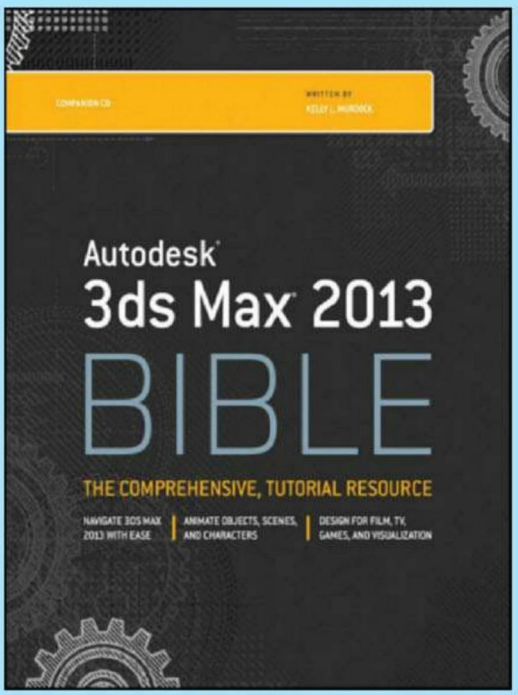
Final Score 9/10

3ds Max 2013 Bible

The latest incarnation of the 3ds Max Bible continues the series' reputation as a great go-to for 3D artists



The opening quick-start tightrope tutorial will help to take your abilities and imagination to new heights from the outset – just try not to look down!



Mayan texts say the world will end in 2012, but the *3ds Max 2013 Bible* certainly begs to differ...

It's generally a safe bet that an updated iteration of the *3ds Max Bible* will follow hot on the heels of Autodesk's annual release of 3ds Max. Now in its twelfth edition, the *Bible* has built a reputation as a great tome of reference. It stands out from many other learning solutions available nowadays in terms of breadth, depth and also size – although this version is noticeably skinnier than its 2012 predecessor.

The *3ds Max Bible 2013* is a chubby 840-page book, having been intentionally slimmed down from previous editions. The rotund *2012 Bible*, for example, has 1,296 pages. So has learning 3ds Max become easier? Not really. This edition is slimmer because there's also an expanded eBook edition that contains an extra 12 quick-start projects and 39 chapters. Some of these extra sections include more advanced topics such as MAXScript, Network Rendering, Radiosity and NURBS.

If you opt for the eBook you can still access the companion CD that's bundled with the print version by emailing a request to Wiley, the book's publisher. And considering the eBook version is cheaper and contains more content, it's hard to see why you would prefer the hard copy.

That said, the book still contains a plethora of content to help 3ds Max artists find their feet. This 2013 version is, as always, very clearly written, easy to follow and an enjoyable way for any beginner to understand how to use 3ds Max. There's also plenty for intermediate users looking to gain skills in areas they are unfamiliar with, or to get a deeper level of understanding of the application overall.

Those fresh to 3ds Max will find a quick-start tightrope tutorial – designed to whet beginners' appetites – a fun introduction to the software, before the laborious-yet-essential study of the fundamentals shapes up. Over 150 mini step-by-step tutorials are scattered throughout the book, so you're frequently testing out tools and topics that are discussed. There's only the minor niggle that it's not an exciting book to look at; presented entirely in black and white, some images are too dark or small to easily understand.

This book does an excellent job of introducing and explaining Max's tools, though, as well as efficient workflow. It may not be as complete as the expanded eBook, but still offers users a wealth of knowledge.

A free disc is packed with a variety of organic and hard-surface assets for use with the featured tutorials

Our verdict

Price: £34 / $50 US
www.wiley.com

Quality	8/10
Ease of use	8/10
Overall usefulness	8/10
Value	7/10

"A worthy learning aid, but the brief format means you're paying more for less compared to the eBook"

Final Score 8/10

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workspace 3D

Inside guide to industry news, studios, expert opinion and education

102 News

Industry news

Vue 11 is announced, NVIDIA heads into the cloud and Andy Serkis looks to direct a mocap take on *Animal Farm*

105 Course focus

Gnomon online classes go live

The Gnomon School of Visuals Effects expands its reach, offering its world-renowned expert CG training through a unique online platform

106 Project focus

'Natalis'

Several students from the Filmakademie Baden-Württemberg school talk us through their ambitious mocap-driven sci-fi animation

108 Studio access

Indie games

Though new to videogames, Adhesive Games' free-to-play mech-combat multiplayer looks to be one of the most visually stunning FPSs we've seen

110 Industry insider

Blur VFX

VFX/CG supervisor Kevin Margo talks discusses taking the reins on videogame cinematics while finding time to direct his own short films

inside

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On Mission
Dong Kyun Ryu
Gnomon School of Visual Effects
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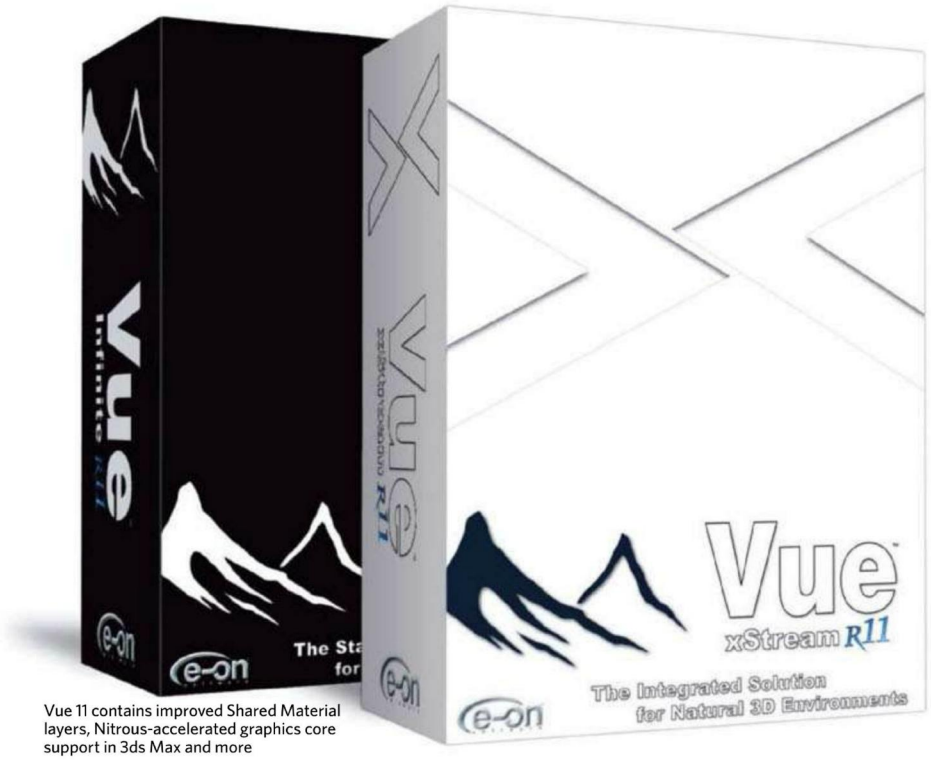

Vue 11 contains improved Shared Material layers, Nitrous-accelerated graphics core support in 3ds Max and more

e-on software announces Vue 11

Environment-creation tools get a raft of new features

The Vue 11 lineup

The Vue 11 product line is built around a three-tiered structure:

- **Vue 11 for CG Professionals:** Vue Infinite & Vue xStream
- **Vue 11 for 3D Artists:** Vue Esprit, Vue Studio and Vue Complete
- **Vue 11 for 3D Enthusiasts:** Vue Pioneer and Theme-Packs & Vue Frontier

The arrival of Vue 11 spells another substantial update to e-on software's environment-creation product range. The new features are a great deal more extensive than those found in past Vue updates, but the main headline is EcoParticles, a new particle system specifically tailored to creating digital representations of nature. Rather than creating simple emitters and having particles grow out of them, you get in-depth control of the way the particles evolve over time. You can now define the speed, direction, collision properties and lifespan of the particles, as well as subject them to external influences. The new technology promises to be ideal for the creation of animated rain, snow, waterfalls, explosions, fire, smoke, tornadoes, falling leaves, swarms of insects and more.

Some other improvements include faster rendering, 360-degree population, a new automated system for creating rain and snow, as well as ease-of-use improvements for EcoPainter and EcoSytems. New additions such as illumination caching will also enable you to re-render global illumination over the course of an entire animation, eliminating the need to re-render the GI pre-pass for every frame. This could dramatically reduce the rendering times of architectural animations, for instance.

You can learn more about the new system at http://tinyurl.com/3DArtistVue11.

"Opinion"

Scaleform development

Small games, big ambitions

Autodesk's Wesley Adams discusses the use of Scaleform when making games

Wesley Adams www.autodesk.com

The casual gaming market is home to a large number of new developers, making for a fiercely competitive business. Developing a game that can rise above the noise presents a huge challenge for any studio – small or large.

Starforce Battlement, a 2D tower-defence mobile game created by our Gameware team, was built entirely in Scaleform. Our team used 3ds Max and the Adobe Creative Suite to design high-quality models, sprite animations and level environments. The result is a more engrossing experience for gamers.

To stand out from the crowd a game must offer a unique gaming experience. Delivering high-quality graphics – similar to what consumers are used to seeing in console games, TV shows and movies – can help set a game apart even more. One way studios can enhance the quality of their graphics is by adopting 3D-development technology into their workflows. Production-proven 3D animation software such as 3ds Max or Maya can help developers increase artistic efficiency in iteration and deliver compelling design to entice gamers. Used to create AAA games, these tools can also benefit casual game studios – even in 2D games.

Starforce Battlement is currently free on iTunes for the iPad. It showcases what small games can do with big graphics

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In the cloud

NVIDIA releases first virtual workstation GPUs

NVIDIA has announced the launch of its first-ever GPU card specifically designed to deliver cloud-based, virtualised workstation performance and capabilities to users on smartphones, tablets and PCs.

The VGX K1 is constructed from four low-end cores and is targeted at large firms with a high number of users to cater to. The VGX K2, meanwhile, is designed for the GPU-intensive designer/engineer market, comprised of two high-end Kepler cores, 8GB of GDDR5 RAM and a slew of other features to increase user density, without sacrificing performance.

"The VGX platform has been developed to bring rich, interactive graphics to all enterprising virtual desktop users," says Jeff Brown, general manager of the Professional Solutions group at NVIDIA. "With VGX K2 in the data centre, designers and engineers who create the core intellectual property for their companies can now access their IP from any device and still enjoy workstation-class performance." Learn more at http://tinyurl.com/VGXBoards.

The VGX K1 and K2 will enable engineers and design professionals to work anywhere, without losing access to GPU computing and graphic performance

Internships

Cinesite opens entries for its popular internship program

VFX vendor Cinesite has opened for entries to its annual internship program Inspire. The 2013 program offers both a visual-effects placement and a programming placement.

"Inspire is now in its fourth successive year and we've been building on the program to address areas where our industry is continuing to lack important skills," said Antony Hunt, managing director at Cinesite. "There are still many computer programmers out there who aren't aware of our thriving industry and the opportunities there are to build a career in visual effects."

Register online and submit your entry for the internship program at www.cinesite.com/internships.

iNSP!RE

Both internships are paid positions and will run for six weeks in the summer of 2013

Animal Farm mocap

Andy Serkis to direct mocap film of George Orwell's classic

Motion capture is a useful tool for bipedal creatures

Mocap maven Andy Serkis, responsible for bringing to life the likes of Gollum and King Kong, has announced that he is to direct a partially motion-captured take on George Orwell's *Animal Farm*. "We are in proof-of-concept stage at the moment, designing characters and experimenting on our stage with the designs," Serkis recently told The Hollywood Reporter. "It is quite a wide canvas as to how much and how far we can take performance capture with quadrupeds and how much we will be using facial [capture]. We are not discounting the use of keyframe animation or puppeteering parts of animals... it's terribly exciting."

Software shorts

Bringing you the lowdown on product updates and launches

RenderMan Pro Server 17.0 and Studio 4.0

Pixar has released updates to its rendering software. New features in both Pro Server 17.0 and Studio 4.0 include improved object instancing, photon mapping, volumetric rendering and adaptive area shadows. RenderMan Studio 4.0 now incorporates the old RenderMan for Maya and has dropped in price to $1,300 US. Pro Server 17.0 remains at $2,000 US. More info at http://renderman.pixar.com.

Blender 2.64

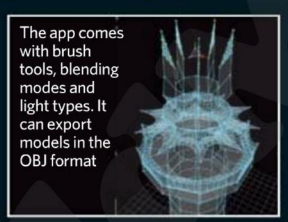
The latest version of the Blender Foundation's open-source CG toolkit Blender has been released with a variety of new features aimed at the VFX pipeline. These include improved motion tracking using a planar tracker, easier greenscreen keying and a new mask editor. A new tile-based compositing system has also been added, along with advanced colour management. Cycles rendering has also received dozens of smaller improvements. Learn more at www.blender.org.

Terrain

Artist and developer Chris West has released an automated terrain-generation plug-in for 3ds Max. Known simply as Terrain, the plug-in downloads digital elevation model data, for a latitude and longitude specified by the user, and automatically converts it into a 3ds Max mesh. The model can be coloured by height, or assigned photographic textures using Google Earth data. Learn more and get the plug-in for $199 US at www.west-racing.com.

Modelling on the go

This new Android app promises to make your 3D art go portable



The app comes with brush tools, blending modes and light types. It can export models in the OBJ format

Scalisoft has released Spacedraw, an Android app described as "the first full-featured 3D modelling software for tablets and smartphones". The app can create curve-, primitive-, polygon- and patch-based models, including extensive texture-mapping, 3D-painting and lighting tools. The results are fairly basic and at this early stage the UI isn't too intuitive, but nevertheless it's an interesting glimpse into the future of 3D modelling on the go. Spacedraw is available now for Android 2.2 and later via Google Play for $4.99 US.

DID YOU KNOW? • An Academy Museum of Motion Pictures is to open in the new LA May Company building

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Course Focus

Gnomon online training goes live

The Gnomon School of Visual Effects reveals a new online training platform for all

GNOMON SCHOOL OF VISUAL EFFECTS

Course
Live online training courses

Course length Ten weeks

Fees $1,200 US per course (discounted for launch, prices will increase in spring 2013)

Student requirements
A passion for art

Website
www.gnomonschool.com

The 50 online courses Gnomon is set to offer in 2013 will include:

Designing Exoskeletons (Hard Surface Organics)
Joe Peterson, Blizzard Entertainment

2.5D Character Design with ZBrush and Photoshop
Ian Joyner, Legacy Effects and Blur Studio

Creature Design
Jerad S. Marantz, creature designer, Aaron Sims Company

Environment Design
Cecil Kim, art director on *God of War* and creative director at Section Studios

ZBrush Creature Design
Scott Spencer, Weta Workshop

Hard Surface Modeling for Production
Kevin Hudson, supervising digital modeller, Double Negative

Character Texturing/Shading with Maya and mental ray
Alex Alvarez, founder of Gnomon and creature artist on *Avatar*, *Star Trek* and *Prometheus*

Introduction to MARI
Brandon Fayette, CG supervisor/ production lead, Bad Robot Productions

Demolition Workflows in Maya
Wayne Hollingsworth, senior FX TD, Sony Imageworks

For over 15 years the Gnomon School of Visual Effects has trained many of the world's best digital artists currently working on blockbuster movies and games. Located in the heart of Hollywood on a 20,000-square-foot campus and labelled 'The MIT of visual effects' by *Fast Company* magazine, the Gnomon School strives to offer the best opportunities for its students, boasting an institutional placement rate of an impressive 97 per cent.

Launching in time for Gnomon School's 2013 term (commencing 7 January), the new online platform will offer 50 courses, each lasting three hours per week for a period of ten weeks. Courses will cover a wide range of subjects, including entertainment design, modelling, digital sculpting, texturing and materials, lighting, rendering, plus more. And in true Gnomon style, all will be taught by leading industry professionals.

Gnomon's exciting new platform will see the online courses presented live via screen sharing, while also supporting webcams. This means the students will be able to see all of their classmates, as well as the instructor.

Gnomon has also developed a new back-end to support each course. Aside from the live lecture component these include private forums, homework, handouts, grading and attendance records – basically everything that students would expect from taking courses on the physical campus in Hollywood.

Head to www.gnomonschool.com for the details of each new program and to discover instructor bios.

> "Over the past year a team of us at Gnomon has been working hard to develop an amazing online experience"
>
> **Alex Alvarez,** Gnomon School founder

Images courtesy Gnomon School

A *Forest Path*
» Alex Alvarez
A variety of software will be covered, including 3ds Max, Houdini, ZBrush, NUKE, Unreal and more. Alvarez in particular will be revealing how to texture characters

B *Mothership Tera*
» Cecil Kim
Cecil Kim, art director on the *God of War* series, will be teaching a course in environment design, something he has a great deal of experience in

C *Flop Footed*
» Ian Joyner
Anyone is welcome to sign up to the courses offered, such as the 2.5D Character Design with ZBrush and Photoshop course led by industry-legend, Ian Joyner

D *The Blind Ones*
» Jerad Marantz
3D Artist issue 46 cover star Jerad Marantz is running a course in Creature Design. Jerad has been working in the film, games and TV industries for over 15 years

E *Archetype*
» Robert Nederhorst
An Introduction to NUKE course will be taught by Svengali FX supervisor Robert Nederhorst. The interactive format will aim to cement the student-teacher bond

Project Focus

'Natalis'

A team of students explores life and death in a photorealistic animation depicting monsters & robots

FILMAKADEMIE BADEN-WÜRTTEMBERG

Project 'Natalis'

Description 'Natalis' is the graduation project of several students at the Filmakademie Baden-Württemberg, Germany. The team has been working on the project for about a year and a half. It tells the story of a robot called Ea, who is threatened by visions and the fear of a devastating future. To avoid it she must make a decision regarding the life or death of a newborn creature, Enki.

Software Maya, 3ds Max, Houdini, ZBrush, Mudbox, Sculptris, 3D-Coat, MotionBuilder, NUKE

Location Germany

School Institute for Animation, Visual Effects and Digital Postproduction

Bio The Institute for Animation, Visual Effects and Digital Postproduction was founded in 2002 as part of the Filmakademie Baden-Württemberg. Led by Professor Thomas Haegele it has become one of the most prosperous educational institutions in Germany and enjoys a great international reputation. Animation films from the Filmakademie have won numerous prestigious prizes around the world.

Websites
www.animationsinstitut.de
www.filmakademie.de

Contributors

Marcel Kühn
Director, modeller, texture artist, animator

Daniel Brkovic
Director, modeller, texture artist, shading artist, animator

Karsten Wagenknecht
Shading TD, rendering pipeline developer

Tom Ferstl
Rigging TD, animation pipeline developer

David Kirchner
Effects TD

Johannes Peter
Compositor

Philipp Wolf
Producer

Graduate short film project 'Natalis' was created by a team of six students plus one producer at the Filmakademie Baden-Württemberg in Germany. It tells the story of the sleek human-mechanical robot Ea, who is threatened by visions of a devastating future. Thrown into turmoil, Ea is faced with the dilemma of saving or destroying the life of a newborn creature, Enki, in order to save the world.

"The original idea was developed by Felix Mertikat, but when he decided to pursue another concept for his graduation [project] he allowed us to use his ideas as a basis for 'Natalis'," explains project director and artist Daniel Brkovic. "We liked his early designs and sketches of the creatures and the world so we developed them further."

The team worked hard on the project for almost two years. "We started with rough storyboard sketches, trying to simplify the initially complex story," says Brkovic. "These sketches were then used to create a first animatic, which was gradually replaced by [the] pre-vis. During this stage we prepared our mocap shoot, which was shot [over] two days at the facilities at Filmakademie."

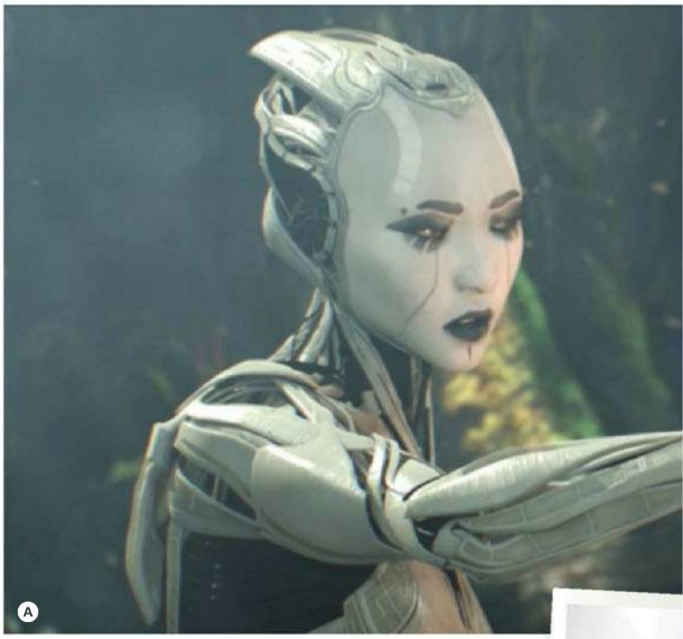
At this point none of the team had any mocap experience – which included the actress playing Ea – meaning the process was one of on-the-job learning. The team captured the shoot on a Vicon stage and used MotionBuilder for the retargeting and motion editing, with final animation completed in Maya. Facial capture was completed in a different studio where a technique called Face/Off: Live Facial Puppetry (which was published as an award-winning SIGGRAPH paper in 2009) was used. The tool captures 3D geometry with real-time structure light scanning. It then fits those scans to a predefined geometry. "This way we got an animated, consistent geometry which then built the base for our blendshape animation system," explains animation head Tom Ferstl.

After cleaning up the data and enhancing the pre-vis with mocap takes, the team moved to lighting the shots and rendering the deformation rig, displacement maps and textures. "Our core software was Maya, which was heavily customised by our technical directors to maintain a good workflow," explains co-director Marcel Kühn. "This incorporated Mel and Python scripts for data/scene management as well as C++ plug-ins for specialised deformers and other nodes.

"For modelling we used various packages," he continues. "For most of the assets we made sketches in Sculptris or ZBrush, which were reptologised and finally sculpted in either Mudbox or ZBrush. Texturing was almost entirely done in Mudbox, with only minor tweaking in Photoshop. This workflow allowed us to create assets in a very artistic way, spending only a little time on the technical aspects."

Photorealistic rendering was a huge focus for the team, the aim being to create a fantasy world that the

> "Everybody tried to create something new, artistically as well as technologically. The result is an interesting and thought-provoking film"
> **Daniel Brkovic,** director



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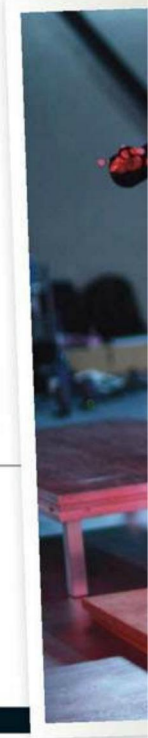
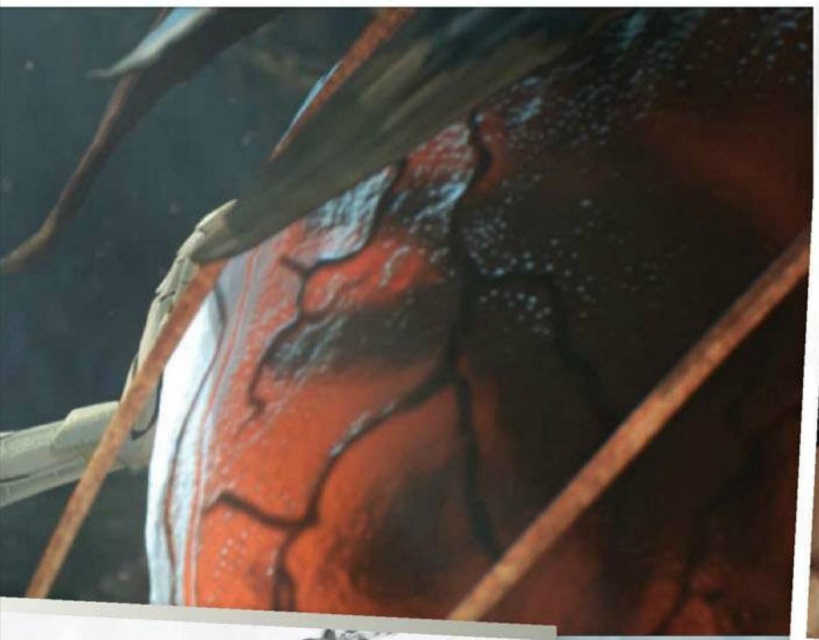


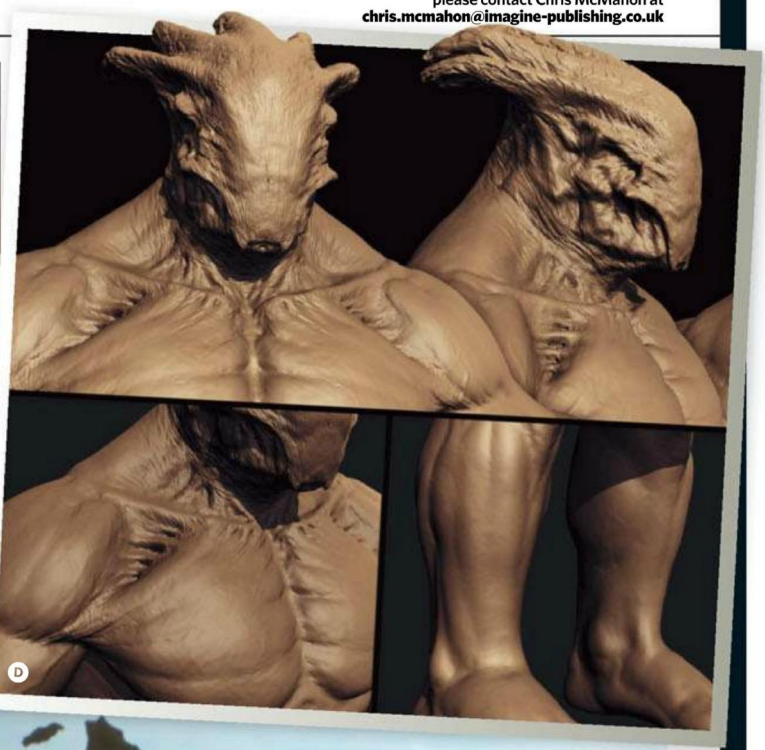
A Choosing the right software for each task was essential to help the team get top results. "Our main rendering package was V-Ray. To achieve photorealistic rendering, V-Ray is always a good choice in terms of lighting and shading," reveals Brkovic

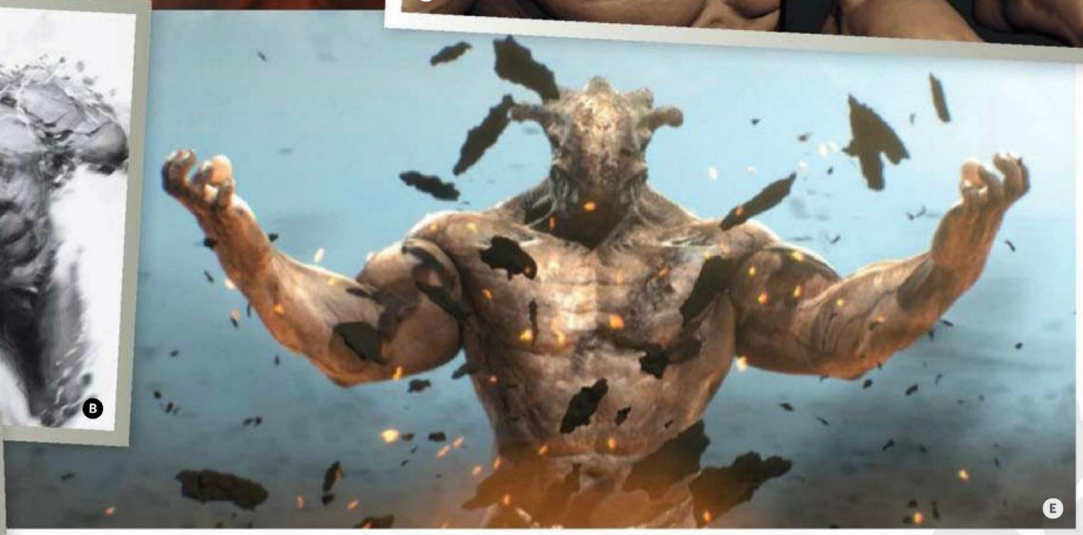
B "One of the most important aspects of the project's success was our structured pipeline, which ensured we were able to focus on the artistic side without worrying about file management and technical aspects," explains director Brkovic

workspace

To submit your project to the **workspace**
please contact Chris McMahon at
chris.mcmahon@imagine-publishing.co.uk







audience feels they can reach out and touch.

"Our main rendering package was V-Ray," says rendering pipeline man Karsten Wagenknecht. "To set up the shading we used the standard V-Ray and subsurface scattering material. V-Ray achieves great shading by connecting the maps, so we only had to tweak a few shader settings in many cases."

"In terms of lighting the characters we exclusively used area lights and a dome light with HDR images," Wagenknecht continues. "For the forest shots it was impossible to render the characters and the location together in one pass, so we split them into separate render passes. To fake the GI and integrate the characters in the forest, we rendered quite a few additional image passes, like Diffuse and Specular passes for every light, and ID passes for [each] material... to achieve the final look in compositing.

"For the desert shots we were able to render the characters as well as the set in one pass so we [could] use raytracing for primary and secondary bounces during GI calculation. This helped significantly to create a realistic look and feel."

C The motion-capture process was new to the team. "The mocap shoot took place in our local studio which is dark and cold. Our actress had to feel like being in a jungle, though, so the day before the shoot we rehearsed in a local botanical garden," Brkovic explains

D 'Natalis' has been as much of an educational program for the team as it has an artistic one. "One of the main goals was to learn as much as possible. Everybody, in his own area, tried to create something new," explains co-director Marcel Kühn

E "The realistic look of the film created challenges in every aspect of the production, requiring detail for hundreds of assets: a fully fledged, anatomically correct muscle system and a robust rendering process," says Brkovic on the complexities of the process

Studio Access

Indie games

Adhesive Games reveals Hawken, explaining how a small team and modest budget can still provide stunning results

ADHESIVE GAMES

Adhesive Games is an independent game studio located in Los Angeles, CA, founded by creative director Khang Le, formerly of Project Offset. Although *Hawken* is the studio's very first game, and is being created independently rather than as part of a high-budget publishing program, it is nevertheless one of the most graphically stunning titles available today.

www.adhesivegames.com

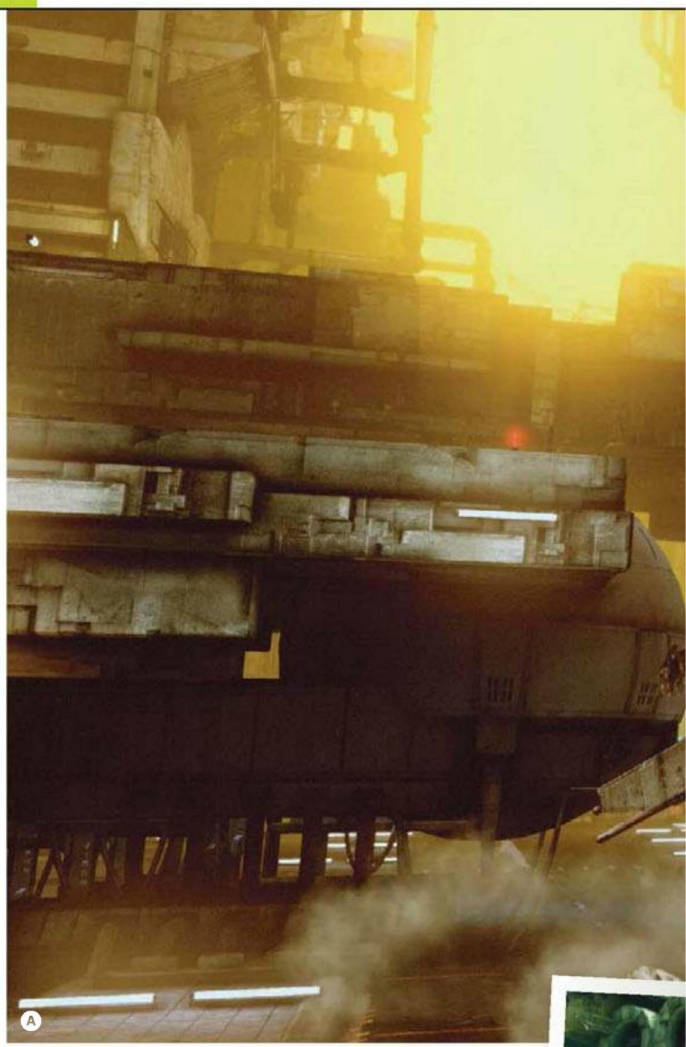
Project *Hawken*
Description Free-to-play first-person mech-shooter *Hawken* is set to launch for its open beta on 12 December. The game creates an intense and enjoyable battle experience, keeping the action fast-paced and strategic while still capturing the feeling of piloting a heavy war machine. For more information on the game, check out **www.playhawken.com**.
Country US
Client Independently developed
Software used Maya, 3ds Max, Photoshop, Unreal Engine 3

Mech combat has been a popular videogame genre for years, but rarely has it looked quite so visually stunning as *Hawken*, the first title to come from the small, independent LA-based studio, Adhesive Games.

"Adhesive Games has its beginnings in 2012 when the four founders started tossing around ideas for a downloadable indie game," says Adhesive co-founder and *Hawken* lead animator Chris Lalli. "We started working on a prototype for *Hawken* in the Unreal Development Kit, which is free to download and use. After nine months we had some gameplay footage that we were very proud of and decided to release a video on YouTube. It took off from there."

The video excited users not just for its free-to-play first-person shooter mech combat, but also for its stunning levels of visual fidelity. "Our art director, Khang Le, mentioned that he wanted the environments to feel like a painting, and I think he's done a good job of achieving that. The game sometimes looks exactly like the concept art," exclaims Lalli. "In his robot design, Khang cited Kow Yokoyama and Maschinen Krieger as influences. Our mechs have more of a clunky, utilitarian feel... like they're scrapped-together tanks. For that matter, nothing in *Hawken* feels clean or sleek. We wanted the world to look worn down and gritty."

Part of what makes the world feel so randomly pieced together, while retaining a sense of aesthetic unity, is the kitbashing system. "We have an awesome concept team, so we're usually working with orthographic views or even a 3D model when we start modelling a mech," says 3D artist Cameron Kerby. "We first create a high-detailed poly model; global shapes will often be modelled by hand, but for smaller details we try to recycle meshes from what we call our 'kitbash library'. It contains over 1,000 meshes we've created over the past couple of years, and the larger it becomes the faster we can work. We kitbash models, textures, mech parts, environments and even practical models – basically reusing many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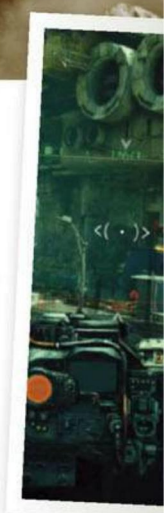


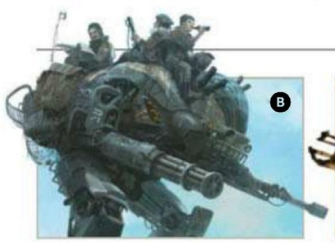
> "Nothing in Hawken feels clean or sleek. We wanted the world to look worn down and gritty. Our environments have a very complex and chaotic feel"
>
> **Chris Lalli,** co-founder/lead animator

Contributors

Khang Le
Creative director

Chris Lalli
Co-founder/lead animator

Cameron Kerby
3D artist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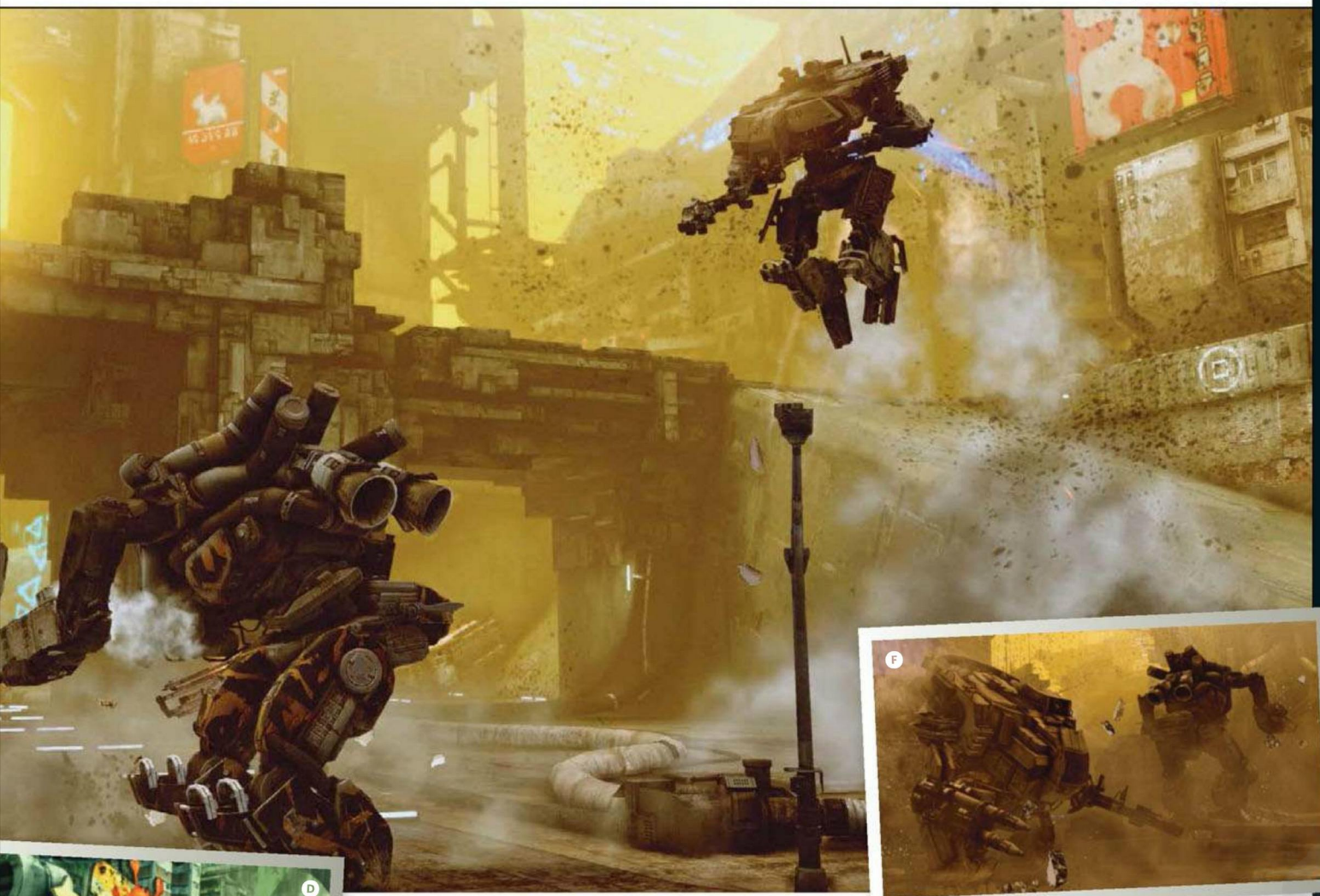
C

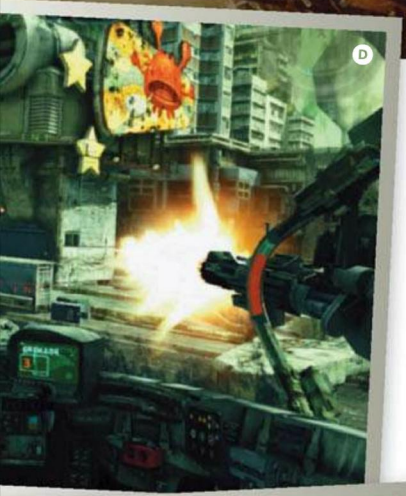
A All the environments in *Hawken* have a deliberately complex and chaotic feel to them. The Adhesive team cite various influences including animes such as *Tekkonkinkreet* and *Ghost in the Shell*, as well as classic sci-fi films like *Blade Runner*

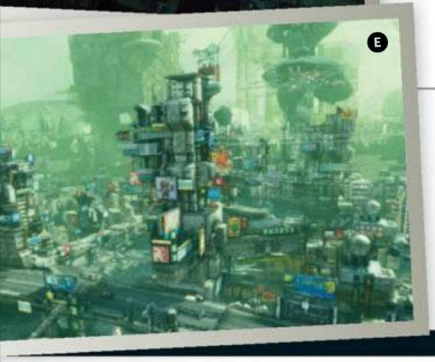
B Animation proved a technical challenge due to the large amount of customisation and combinations players can apply to their mech creations. You can find out how the Adhesive team overcame this by visiting **http://tinyurl.com/3DAHawken**

workspace

To submit your project to the workspace please contact Chris McMahon at chris.mcmahon@imagine-publishing.co.uk







of the same pieces in different ways to create objects that seem unique. Everything in the world we've created has this vibe that it's been pieced together with whatever they had lying around. This junky approach to design is extremely enjoyable to work with, and is also very forgiving as you can get away with some imperfections."

As for the somewhat contradictorily stunning yet grimy look of the environments, it's been a similar case of artistic and technical know-how working in tandem. Adhesive hopes this will result in a truly unique feel. "Often in production you'll notice people seeing the trees, but not the forest," says Kerby. "Le has a fantastic eye for this global aesthetic. In other words, we've only put forth a lot of effort where it was appropriate. We don't want to spend hundreds of man hours on environment assets you're just going to zoom past as you're gunning down another mech. Most of the environment meshes are strictly low-poly, using tiling textures of texture sheets. In fact, there are probably only a dozen or so textures that make up each map. With these techniques, we can create a large volume of assets fairly quickly. After that point it's up to our designers to go to town! Most of our building structures are kitbashed together using seemingly random meshes. If you stop and stare it might not make much sense... but remember: global aesthetic! Collectively they serve their purpose in bringing forth an overall look and feel."

You can read the full *Hawken* interview at 3DArtistOnline.com through this link: http://tinyurl.com/3DAHawken.

C Because of the independent, low-budget nature of the project, saving money was key. Adhesive found the free tool xNormal useful during development, especially its Bake Base Texture option when merging multiple meshes to one texture

D Getting the right aesthetic is important. "We try to stay away from the chipped-metal look you see in a lot of sci-fi games," explains 3D artist Cameron Kerby. "We prefer a more grimy, oil-stained feel. This fits right in with the environment and atmosphere"

E Adhesive started off with just four employees, but now has around 25 people working on the game, with 13 staff in art and animation alone. The project has already attracted a lot of attention and was well received at this year's E3 videogames convention

F Adhesive has made use of Epic's Unreal Development Kit. The team also made used a lot of the software Epic has partnered with, such as SpeedTree, Scaleform and Simplygon. The availability of these tools means indie games such as *Hawken* can exist

Industry insider

Blur VFX

VFX/CG supervisor & independent director

Blur Studio's Kevin Margo discusses balancing professional and personal work without losing his passion for either

About the insider

Job VFX/CG supervisor & independent director

Education BFA in General Fine Arts, Maryland Institute College of Art

Company website www.kevinmargo.com

Location California, US

Biography Kevin grew up in suburban New Jersey where he discovered a love for the visual medium. He attended MICA before gaining employment at Firaxis Games. While there he executed the bulk of CG creation on its trailer releases, something that caught the attention of Blur Studio, where he was hired in 2003. He currently works at Blur as VFX/CG supervisor while exploring live-action filmmaking in his personal time.

"It's from the established art form of linear narrative, which films excel in, that keeps the games industry seeking cinematic contributions to its games," says Margo

Born in the suburbs of New Jersey, it didn't take Blur VFX/CG supervisor Kevin Margo long to realise that his passions lay in comics and art. He followed this love throughout his time at middle school, going on to study General Fine Arts at the Maryland Institute College of Art.

His interest in the surging CG medium led to a two-year employment opportunity at the much-respected Firaxis Games in Baltimore, and it was while working there that he came to realise his motivations didn't necessarily lie in the interactive side of game development. "During my time at Firaxis it was frustrating to watch the art produced degrade into 2D-sprite-dithered-palette game engine requirements," he tells us. "[So] I jumped at opportunities to work on the occasional cinematic or trailer we were creating, as that format respected the source quality much more so than a game engine."

By the end of his time at Firaxis, Margo had directed and executed the bulk of CG creation on the company's latest trailer release, an effort that caught the attention of VFX, animation and design studio, Blur. Hired by Blur Studio in early 2003, starting out as a staff artist with duties such as character modelling and rendering, he soon moved into the supervision side of projects.

Margo has been excelling as a VFX/CG supervisor at Blur ever since, ensuring his personal projects stay as important to him as professional ones. "Commercial work can be very rewarding, but nothing compares to self expression," he says. "It's exciting to find a medium that is intimate in process, achievable with limited resources, yet expansive and ambitious in scope."

What are the most challenging projects you've been involved with at Blur?

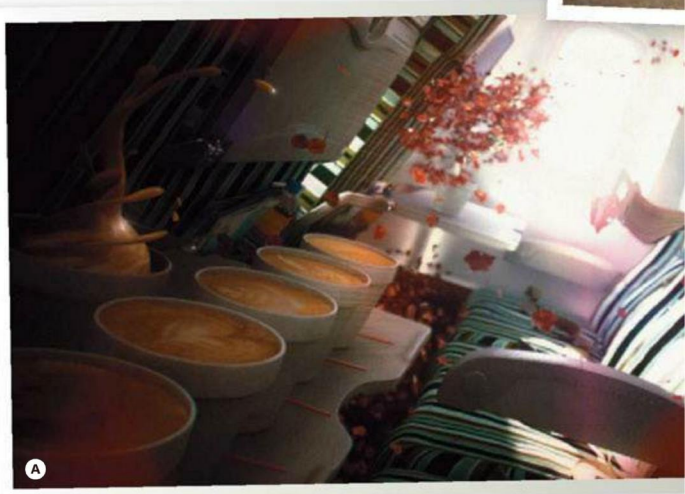
Blur's short film 'RockFish' was likely the most intensive project I've worked on. The Oscar-submission deadline was looming and we were compositing shots while a courier waited at the front door to send chunks of finished footage to the print house. *Aeon Flux* was another intense one... a team of two assembled it and rendered a two-minute, 40-shot cinematic in nine days. *Knights Contract* was [also] challenging as we began transitioning the studio to V-Ray on that project, so it was a steep learning curve to embrace a new renderer while executing a three-minute project, maintaining and raising the internal visual bar in the process. Most recently the *Halo 4* launch trailer was tough due to its hybrid nature. Half was live-action with greenscreen CG set extensions and miscellaneous VFX, the other half was an all-CG pipeline. Helping to develop Blur's live-action VFX pipeline more robustly, while handling both VFX and CG supervisor responsibilities, was demanding in the midst of managing client input.

Do you get much time to work on personal projects out of office hours?

I try to make time! Blur is a great place to find creative fulfilment, but I still dabble in the fine arts with figure drawing, photography, landscape painting and I always have a sketchbook on hand to jot down ideas or do observational doodling. Lately I've been doing some of the above on my iPad with a stylus... I've grown fascinated with physics, quantum mechanics and string theory. Indirectly the ideas explored in these sciences influenced my short film 'Grounded'.

Tell us more about 'Grounded'?

This was my first venture into directing. I wrote, directed, pre-visualised, produced, edited and did all the VFX work and promotion of it. I wore many hats and learned a ton in the process. When literally every task you are doing is a new experience, the brain is in overdrive soaking it all up... It's exhausting but also very rewarding.



Portfolio highlights

Kevin Margo has many impressive credits to his name, including:

- **2012** *Halo 4* launch trailer
- **2012** *The Amazing Spider-Man* opening title and Oscorp Lab holograph sequences
- **2011** 'Grounded' short film
- **2010** *Batman: Arkham City* videogame trailer
- **2010** *Firefall* trailer
- **2010** *Dante's Inferno* game cinematics and TV Spot
- **2009** *Terminator Salvation* game intro cinematic
- **2008** *X-Men Origins: Wolverine* game cinematics
- **2005** *Aeon Flux* game cinematics
- **2003** 'RockFish' short film

workspace
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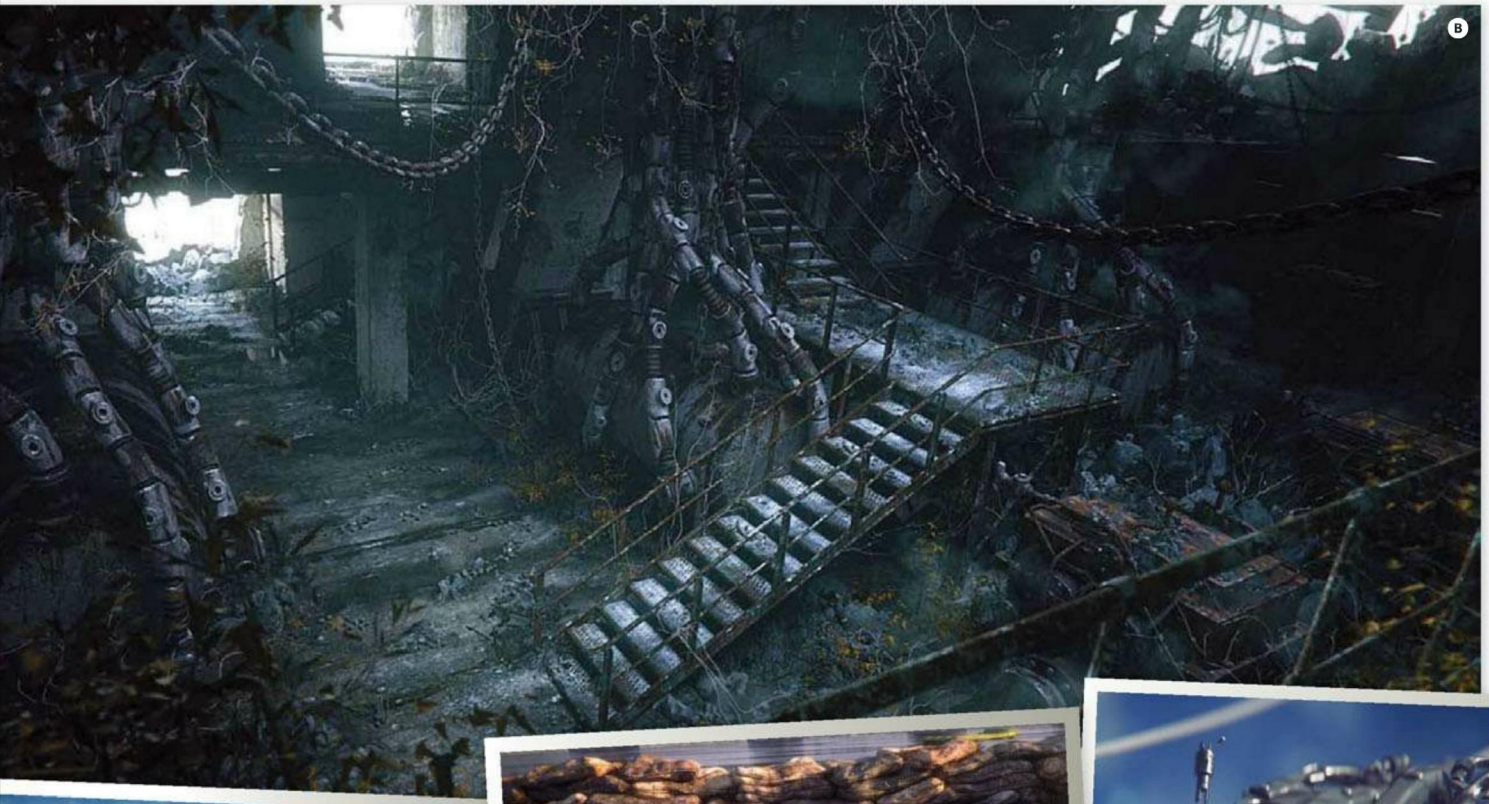

All images © Kevin Margo

What tools do you use in your work?
For 'Grounded' I used a Canon 5D Mark II, which is an exceptional camera given the price bracket... Keying and tracking atop its compressed 8-bit H.264 footage proved challenging, but the unaffordable alternatives were using a camera 20 times the cost.

For visual effects I use PFTrack for camera tracking, ZBrush for characters [and] 3ds Max for modelling, scene assembly and effects. I use V-Ray for shaders, lighting and rendering, Fusion for compositing, Sony Vegas [software] for [video] editing, After Effects and Magic Bullet at times for colour grading, and Softimage for rigging and animation.

Tips for success

Margo reveals the attitude required to make it in the CG industry...

Work hard. Really hard. Avoid distractions, envy and self-destructive thinking. Surround yourself with people you respect and who inspire you. Be curious, ask questions and challenge convention. Lead by example. Listen intently. Focus on your voice and interests that resonate at the deepest level. From there infinite energy and motivation will arise... not to mention your strongest work.

> "Deadline was looming... we were compositing shots while a courier waited at the front door"

A *Six Coffees* is one of Margo's own pieces exploring CG. Though Blur Studio satisfies a lot of his need for creative output, he still finds time for personal work

B Margo relishes the challenge of balancing budget and time with quality. "It's about enabling the team to reach [the full] potential of every task," he says

C You can watch Margo's personal short at **http://groundedfilm.com**. "It was my first venture into directing," he says. "It was exhausting but rewarding"

D *Pillows* is one of Margo's personal works. He says the result interrogates how objects of a similar physical form and behaviour serve different functions

E Margo feels that cinematics now produce results of a much better quality than before, including more realistic character creation and rigging

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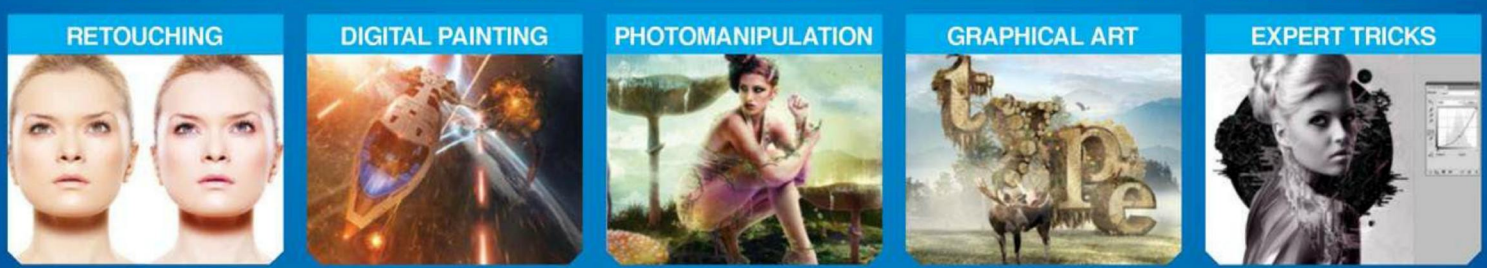

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UNLEASH YOUR IMAGINATION

Bruce Heinlein

Q: Did you have any 3D software experience before coming to the DAVE School?
A: No, not at all. My background was mostly graphic design.

Q: How has your experience at the DAVE School been so far?
A: It has been great, I have learned so much in such a short period, it has also opened up a whole new level of possibilities for my creative side.

Q: Tell me about this Model?
A: This was created in less than a week. It was our second week project.

Q: Wow! Did you think that you would be able to create something like this in your second week of school?
A: Absolutely not! When the instructor showed us the reference material, my jaw dropped! I'm glad that I decided to come to the DAVE School, and look forward to what I can do next.

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